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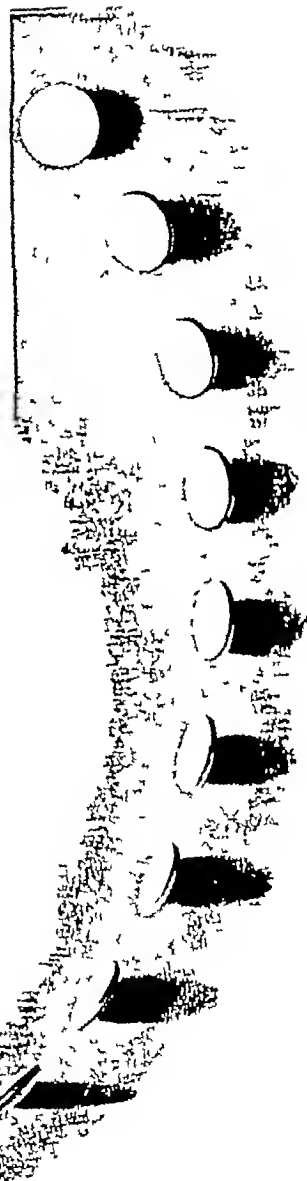
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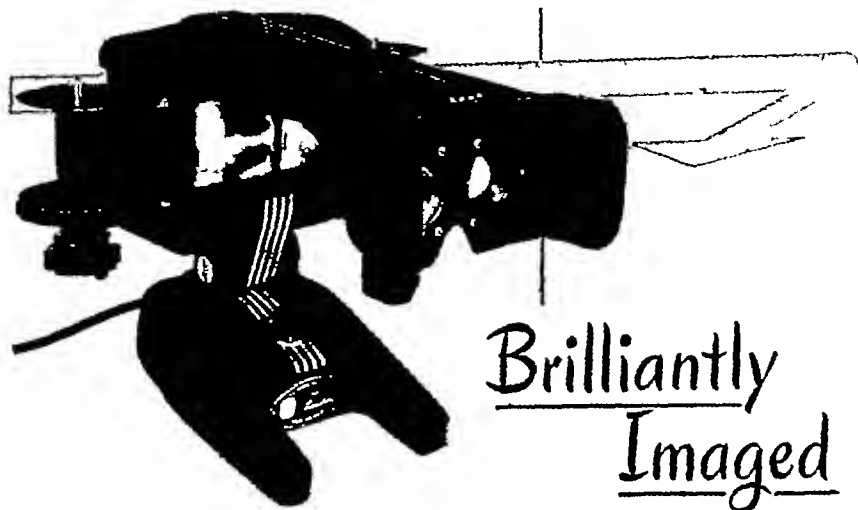
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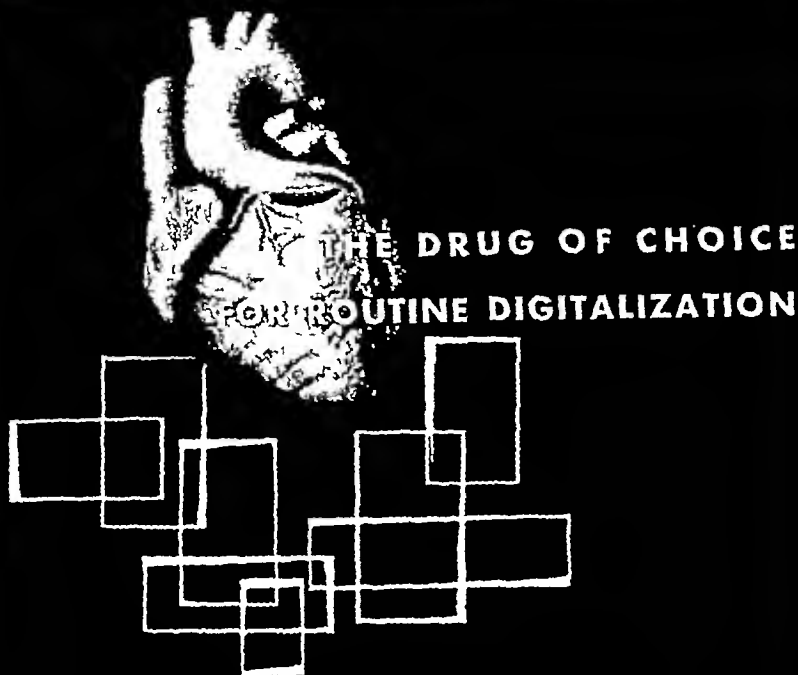
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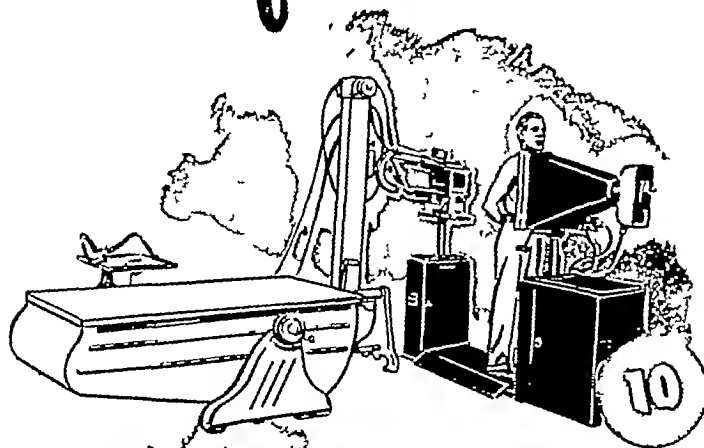
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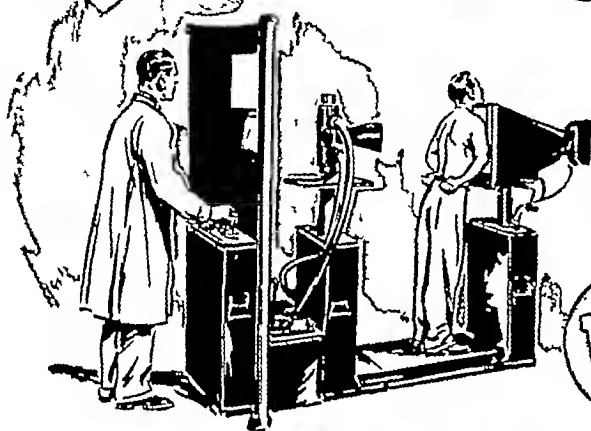
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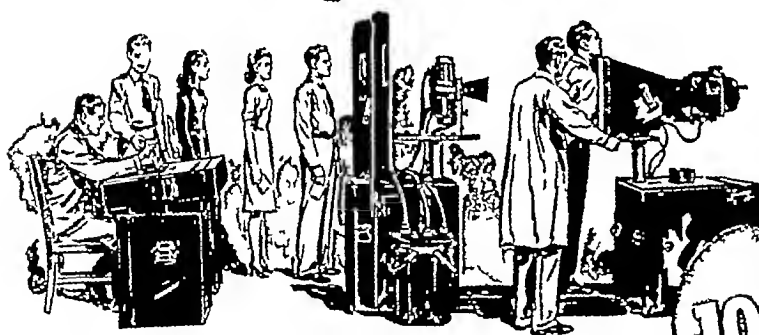
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# DISEASES *of the* CHEST

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VOLUME XIII

JULY-AUGUST 1947

NUMBER 4

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## Inhalation Therapy in Chronic Bronchial Infections

EDWIN R. LEVINE, M.D., F.C.C.P.\*  
*Chicago, Illinois*

### THE PROBLEM

Chronic bronchial infections are notoriously resistant to methods of treatment. The pathology and physiology of this condition give adequate reason for their resistance to therapy. Pathologically, the bronchial walls are thickened and fibrosed with a marked decrease in the blood supply to the infected areas. The involved bronchi are constantly filled with purulent secretion, and there is frequently some anatomical obstruction to free drainage. From a physiological standpoint we observe very definite deviations from the normal. These bronchi are more irritable and much more liable to spasm than are normal or even acutely inflamed bronchi. On bronchoscopy one can visualize irregular spasm which produces the picture of local constriction. Thus, without any definite anatomical obstruction it is possible to have interference with drainage caused by muscular contraction. This is most marked with forced expiration and is particularly seen in cough. The retention of secretion that is produced by this mechanism is one of the factors in chronicity of bronchial infections.

Further evidence is found to explain the failure of medication which depends upon the blood stream to reach the infected area. In almost all cases, if not in all cases, there is a very marked decrease in ventilatory activity in the region of the bronchial infection. This, as has been shown by Hamilton,<sup>1</sup> is accompanied by marked decrease in blood supply to this area. Thus, we find that regardless of the blood level obtained with the use of any agent that little of the agent in question reaches the infected area, and

---

\*From the Chest Service of Michael Reese Hospital, Chicago, Illinois, and the Winfield Sanatorium. Aided in part by a grant from the Susan Wein Foundation. Presented at the 12th Annual Meeting, American College of Chest Physicians, San Francisco, June 28, 1946.

when it does, the little that does has difficulty in penetrating the barriers that the body itself has thrown about the infected area. The very absence of elevated temperature and toxic symptoms during the chronic phase of this disease is indication that little exchange of any sort goes on between the infected areas and the blood stream. It is for this reason that inhalation of a therapeutic agent would appear to be more valuable than the application of that same agent by any other means.

A fine mist or aerosol can be produced as shown by Castex,<sup>2</sup> Krueger,<sup>3</sup> Barach<sup>4</sup> *et al*, and inhaled with the inspired air. The concentration of the medication in question should reach a sufficient level at the site of infection to produce the desired result. The following experimental work was done to determine as accurately as possible, whether this method of therapy actually affected the diseased bronchi.

### SELECTION OF MATERIAL

It was necessary, first, to rule out any improvement that could not be attributed to the inhalation therapy. Spontaneous improvement in chronic bronchial infection is a common occurrence. Patients frequently show marked change with feeling of well being, decreased cough and expectoration and with almost complete absence of other symptoms simply on being put to bed, and as a result of general constitutional care. Furthermore, if adequate



Figure 1



Figure 2

*Fig 1* H C 54 year old man with long history of cough expectoration and disability. Bronchography shows areas of cystic bronchiectasis in the left mid-lung field and cylindrical bronchiectasis in the right and left lower lung fields. An emphysematous area in the left base has crowded the remainder of the parenchyma and the lower bronchi towards the mediastinum—*Fig 2* H C, Lateral view of bronchography showing cylindrical, saccular, and cystic bronchiectasis.

drainage can be established, many chronic bronchial infections, even with bronchiectatic changes present, will show marked improvement and some times complete clearing of symptoms The following case illustrates this point

H C, a 54 year old laborer, with a history of severe cough and profuse expectoration for a period of a great many years This became so severe and produced such marked weakness and dyspnea that patient was unable to continue work, and for 4 years was completely disabled by symptoms X-ray film of the chest showed suspicious shadows in the left mid-lung field and bronchogram indicated cystic, saccular, and cylindrical bronchiectasis (Figs 1 2) He was placed on a regimen of rest, postural drainage, and antispasmodic cough medication, and began to show very marked improvement with decrease in cough and expectoration After a period of several months, he was able to climb stairs returned to light work and then to regular work He has been engaged in full-time work without any recurrence of his illness for the past two years

Thus, we see that even in patients of advanced years a long-standing history, definitely demonstrable x-ray changes, and markedly increasing symptoms, marked relief which is lasting may be obtained by postural drainage and symptomatic treatment alone Furthermore, some of these patients will show marked relief, if not cure, by the use of chemotherapy or antibiotics orally or parenterally Some patients show little if any symptoms despite extensive anatomical bronchiectasis

A P, a 32 year old female whose general health was good with no history of cough, expectoration, or respiratory symptoms except an occasional cold She had a sudden hemoptysis amounting to about a dram



Figure 3



Figure 4

Fig 3 A P 32 year old female No cough no expectoration, had sudden hemoptysis X-ray shows some slight increase of markings at left base —  
Fig 4 A P, Bronchography indicating extensive saccular and cystic bronchiectasis of the right lung existing despite complete absence of symptoms

and a half X-ray showed no particular pathology, with some suggestion of increased markings at base (Fig 3) Bronchography with contrast medium showed a very extensive saccular bronchiectasis in the right lower lung field (Fig 4) No particular treatment was instituted, and the patient has remained well with no symptoms of any sort

Secondly, it is necessary to rule out any effect that may be obtained by the absorption of the agent through the alveoli and its action through the blood stream rather than directly For this reason the following criteria were used on all of the patients in this experimental group

- 1 There must be definite bronchographic evidence of bronchiectasis
- 2 There must be a history which is definitely of this type of infection for a long period of time
- 3 All of the patients should have been previously treated by all other methods of medical treatment including bed rest, postural drainage, sulfonamides by mouth and penicillin by injection

Bronchographic evidence of bronchiectasis was found in all patients included in this group All except four of the patients had

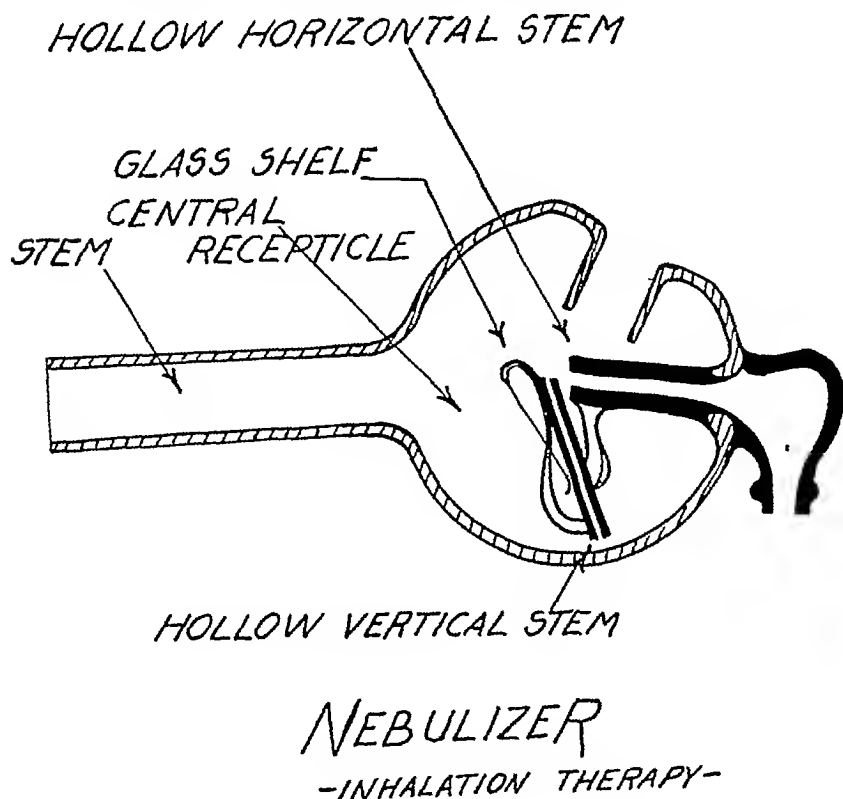


Figure 5 Diagram of Vaponefrin nebulizer

a history of symptoms for 20 years or more. All cases had received medical treatment, sulfonamides and penicillin previously without any effect. It was felt that by adhering to these three criteria that if any improvement was obtained by inhalation therapy, it would be fair to ascribe that improvement to the therapy and not to any accidental or spontaneous improvement. This would appear to be more accurate than selecting an equal number of controls although a similar series of patients under treatment in our clinic has also been used as control.

### THE METHOD

Penicillin was used as the agent of choice because its action is not inhibited by presence of pus. No attempt was made to use a great many different agents since the purpose of this investigation was to determine the efficacy of inhalation treatment and not that of a particular drug. The apparatus used was the glass nebulizer known as the Vaponefrin vaporizer (Fig 5). This, as can be observed, is an all-glass device which produces a microscopic spray in a relatively cylindrical form (Fig 6). The patients were instructed to hold the nebulizer at a distance of 2" from their mouth, and keeping the mouth wide open, to inhale and exhale deeply.

The various types of apparatus that have been described in the literature were tried and did not appear to be as simple in use nor as efficacious as the uncomplicated nebulizer itself. Further, it appears that if the tip of the nebulizer is put in the mouth instead of being left outside, the spray will strike and adhere to the cheeks, tongue, and pharynx, and thus only a small part of it be inhaled into the bronchial tree. If it is held at this slight distance from the mouth, the vapor mixes better with the inspired air.

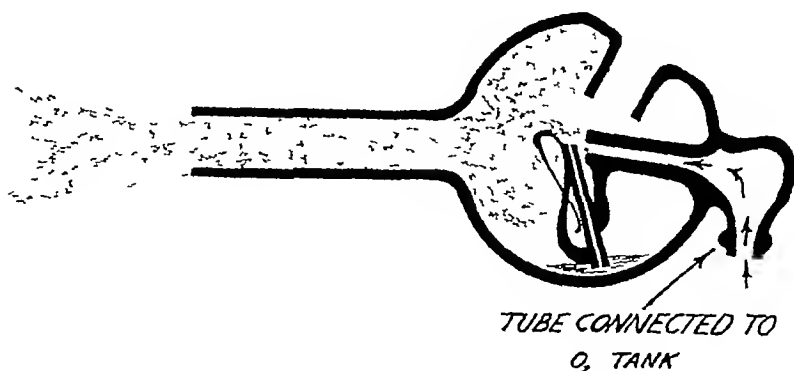


Figure 6 Diagrammatic representation of production of spray in a relatively cylindrical form for about 2 inches after leaving nozzle of nebulizer. For this reason it is more efficacious to place the nozzle about 2 inches from the mouth and allow the fine mist to mix with the inspired air.

The penicillin used was both the sodium and calcium salts of any manufacturer which our pharmacy department happened to have on hand at the time. This was dissolved in normal saline solution and administered in concentration varying from 1,000 U per c c to 20,000 U per c c. As will be indicated later the concentration *per se* did not appear to be an important factor in the determination of the result. The amount used was one c c for each administration. In our earliest work about 2 years ago the patients were instructed to inhale the penicillin solution once in 3 hours. As time went on, we increased the frequency as well as the concentration, and soon had our patients using the treatment on an hourly basis. However, as will be indicated later, this again did not seem to show the degree of importance in the handling of these cases that would be expected.

#### PATIENT GROUP

Forty-two patients fulfilling the above three criteria were used in this experimental group. These patients were 26 males and 16 females. The age ranged from 8 to 80 years, however, with the exception of 4 patients, they were all adults with an average age of 50 years. The duration of symptoms ranged from 8 years to 64 years. Only 4 of the patients had history of less than 20 years duration, and these 4 ranged from 8 to 14 years. Twenty-eight of the thirty-eight had histories of 28 or more years of steady bronchiectatic symptoms, so that there was no patient in this group with a duration of less than 8 years, and with an average duration of 25 years for the entire group. Every patient in this series showed cough, profuse and purulent expectoration, recurrent pneumonias, while 33 had hemoptysis, marked dyspnea, and long periods of, or constant complete disability. Bronchoscopy was performed to determine the extent of major bronchial damage and to rule out possible tumors. Bronchography followed to establish the necessary criterion that there be saccular or cylindrical bronchiectasis shown on x-ray. Every patient was under observation for a period of time before the start of treatment. Postural drainage, cough medication, vitamin A, and general constitutional measures were used without effect. Sulfonamides by mouth were administered in every case without noticeable improvement, and penicillin by intramuscular injections. Any patient showing improvement by these means was dropped from the series. Culture of bronchial secretion was taken by bronchoscopy and by technic of direct expectoration into a sterile petri dish. The similarity of the culture by the two methods, when a careful sputum technic is used, seems to make the bronchoscopic smears unnecessary for accurate work.

## ORGANISMS

The sputum was cultured, organisms identified, and their sensitivity to penicillin determined. A great many different organisms appeared in the sputa. Hemolytic streptococcus, streptococcus viridans, anhemolytic streptococcus, staphylococcus aureus, bacillus proteus and Friedlander's bacillus, were the most common organisms found.

TABLE I

Strep Viridans	23
Hemo Strep	16
Anhemolytic Strep	15
Staph Aureus	12
Neisseria	12
B Proteus	6
Friedlander's	5
M Catarrhalis	4
H Influenzae	4
Staph Albus	4
Alpha Strep	2
B Coli	2
Hemo Staph	2
Diphtheroid	1
Gram Neg Bacilli	1

The very frequent occurrence of streptococcus viridans, which is not customarily expected in bronchial infections, was a point of more importance than was anticipated.

## RESULTS

Treatment was started at the beginning of this series in 1944 using 1,000 U of penicillin per c.c. The patients were instructed to nebulize 1 c.c. of this solution every 3 hours. Treatment continued over a period of 3 to 4 weeks. Eighteen patients were thus treated with what is now considered a very low concentration of penicillin. In this group of 18, ten patients showed complete clearing of cough and expectoration and the abolition of all symptoms. Four patients showed very marked improvement, but still continued to cough in the morning. One patient showed some improvement, but still had symptoms, and three showed no improvement.

It was noted that some patients who showed such marked relief showed no change in their bronchographic picture, and a great many of them had a recurrence of symptoms following the next upper respiratory infection. Bacteriological studies indicated that the organisms found at the time of the recurrence were not the



same organisms that were present before treatment, indicating a new infection which had taken place in the already pathologic bronchial tree. With recurrences these patients were treated using high concentration of penicillin varying from 5,000 U per cc to 20,000 U per cc. During this period we also increased the dosage on all of the new patients who were studied, and all of these patients were started on increased concentration, 10,000 U per cc at first and 20,000 U per cc in some of the cases. In the entire group of forty-two cases, 19 patients showed complete cessation of symptoms and abolition of cough, 14 patients showed relief with no constitutional symptoms and little or no expectoration, although cough continued, and 8 showed insufficient change to be considered a good clinical result. Of the 33 patients in whom improvement was noted, only 9 maintained this improvement without recurrences. The other 24 patients had 34 recurrences in all. As was noted before, these recurrences were accompanied by change in the bacterial flora, indicating a new and not a recurrent infection.

### RECURRENCE AND REINFECTION

This high incidence of recurrence of symptoms which was actually a new infection or a reinfection in a diseased area is perhaps the most typical clinical finding in bronchiectasis. We have always known that bronchiectasis has its good periods and bad periods. In the light of these findings, it would be reasonable to suppose that just as upper respiratory infection was followed by deep infections in the bronchial tree in these cases where the bacteria had been destroyed or rendered inactive, we may assume that customarily in bronchiectasis, the flare-up may be due in part to new organisms implanted on an old infection.

The 9 patients who had no further recurrences were individuals who despite their lack of symptoms followed a regime of postural drainage and regular hours. In the others, further breakdowns were avoided by placing patients on such a regime following the second or third infection. In some of our patients mild respiratory symptoms appeared from time to time—cough, wheezing with little or no evidence of deep infection, which was not classified as recurrence of bronchiectasis. This was treated by cough medication designed to liquefy the sputum and relieve bronchial spasm, and postural drainage. It was found that this was sufficient to prevent more severe symptoms in almost all cases.

### CONCENTRATION OF PENICILLIN

In almost all of these cases no significant level for penicillin was secured although high blood levels in normal patients inhaling

similar concentrations of penicillin have been obtained. This we feel can be explained by the pathological changes present in these old chronic cases, and the failure of any absorption from the bronchial tree. The good clinical result and the disappearance of the bacilli from the bronchial tree indicate that the effect of the penicillin used was directly by inhalation and not indirectly by absorption and production of an adequate blood level.

The following case histories, one of a young patient and one of an older patient are typical of the good results obtained.

1 F K, a 14 year old girl. Onset of symptoms of bronchiectasis began in infancy following pneumonia. She had constant cough, expectoration, irregular temperature, and recurrent pneumonic syndrome all of her life. X-rays of chest show very little change. Bronchogram showed extensive bronchiectasis in the left lower lobe with a smaller amount of similar pathology on the right (Figs 7, 8). She was hospitalized, and culture of sputum secured at bronchoscopy, strept hemolyticus, strep viridans, staph albus, were isolated, and a series of penicillin injections given—200,000 U a day for a period of one week. Sulfonamides had been used extensively before hospital admission. There was no noticeable improvement in symptoms or clinical condition. After a 2 week rest during which time the patient was on postural drainage with no further improvement. Inhalation of penicillin solution (1,000 U per cc) was instituted. Symptoms disappeared completely at the end of the first week. This treatment was continued, however for a period of 4 weeks. She remained completely well without any symptoms until she contracted a severe cold 10 months later. All symptoms returned. On this occasion a bronchopneumonic patch was found in the right lung, and alpha streptococcus and staphylococcus albus recovered in the sputum. She was placed

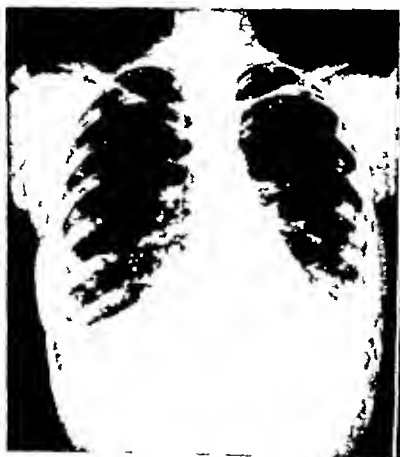


Figure 7



Figure 8

Fig 7 F K, 14 year old female. With cough, expectoration, and recurrent pneumonias since early infancy. Bronchography showing extensive abscess and bronchiectatic areas in left base and some saccular bronchiectasis close to the mediastinum on the right.—Fig 8 F K, Left oblique x-ray showing the bronchiectatic areas in the left base more clearly. Bronchiectasis in the right is seen behind the heart shadow.

on penicillin inhalation (5,000 U per cc) and postural drainage. The chest cleared up, and her cough disappeared at the end of one week. Six months later there was a similar recurrence of symptoms which cleared up completely in 2 weeks treatment of penicillin inhalation.

2 S S, a 45 year old patient in whom bronchiectasis was diagnosed as such 20 years ago, and who had been treated with large amounts of each sulfonamide compound successively and had received 2,000,000 U of penicillin by injection (Figs 9, 10). This patient suffered from constant cough and copious, often foul, expectoration, cyanosis, clubbing of fingers, recurrent periods of complete disability ranging from 1 to 6 months. Sputum studies showed hemolytic streptococcus and staphylococcus aureus. Treatment was started using penicillin solution 1,000 U per cc. He showed a marked improvement with decrease of cough and expectoration and complete disappearance of cyanosis. A month after start of treatment, he acquired a severe respiratory infection, and at the time sputum culture showed hemolytic streptococcus and alpha streptococcus. The concentration of penicillin was increased to 5,000 U per cc, and he was continued on this therapy for another 3 months. During this period postural drainage was used twice a day. His dyspnea and cyanosis disappeared completely, and there was a gradual return of energy as cough and expectoration ceased entirely for the first time in 20 years. He started to engage in business activity and returned to full-time work as salesman, and has had no recurrence of symptoms for a year.

### DISCUSSION

The results obtained from this study would seem to indicate that medication inhaled as an aerosol has a definite therapeutic effect in chronic bronchial infections. The group of cases selected for this purpose removed the possibility of spontaneous improvement or of improvement due to general medical attention and

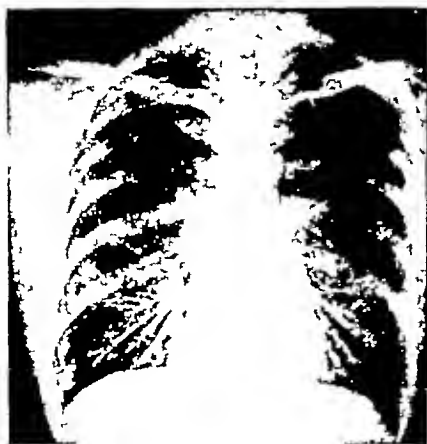


Figure 9



Figure 10

*Fig 9* S S, 45 year old male with 20 year history of known bronchiectasis. Bronchography shows extensive saccular bronchiectasis in both lower lobes —  
*Fig 10* S S, Lateral x-ray showing saccular bronchiectasis at base

increased drainage Since chemotherapy had been tried by many orthodox methods before inhalation therapy and since the blood level was not found to be sufficient in any case, we must come to the conclusion that any improvement was due to the direct, topical action of the penicillin on the bronchial mucosa The variations in result can be attributed to the type of organisms involved Where the study showed an organism sensitive to penicillin, a good and fairly rapid result was obtained In those cases where the organism was relatively resistant, a longer period of treatment was needed, a higher concentration necessary and a less definite result secured And in the group of cases in which no improvement was noted, the organisms in all cases were gram negative bacteria and other bacteria on which penicillin has little effect If we classify our cases according to their penicillin sensitivity, we have had 100 per cent good results in patients whose bronchial lesion was caused by penicillin sensitive organisms, and 100 per cent bad results in cases where the organism was penicillin resistant The moral of this is clear Inhalation is a method of bringing an agent in contact with pathogenic bacteria It can do no more than that It is interesting that inhalation of sulfonamides first reported by Castex and his co-workers<sup>2</sup> has produced some good results A much more important step is the report of Oisen<sup>5</sup> on the combined use of streptomycin and penicillin, and the excellent results obtained by this means We may, therefore, say that inhalation therapy has a definite and unquestioned value in the treatment of bronchial infection, and that the limitations are those of the chemotherapeutic agent and not of the technic From our own and the experience of others, we can extend this technic to all bronchial or bronchopulmonary infections since the most resistant group, the group most difficult to treat, the long-standing bronchial infection with fibrosis and emphysema has shown response to this method

A further point of great interest was the large amount of recurrent or new infection that settled in this area of diseased bronchi It is quite evident that inhalation is only one of the measures of medical treatment, and it is important for the physician to follow his case of chronic bronchial infection carefully and for a long period of time As has been shown in this series, recurrence of symptoms may be frequently prevented by the use of medication and postural drainage And when these symptoms become more troublesome, another course of inhalation therapy is indicated

The experience with other bronchopulmonary infections which have responded to one or another type of treatment, has led us to believe that if infection can be kept away from the pathological

bronchi for a sufficiently long time, it is not too much to expect that the pyogenic membrane can be replaced by bronchial epithelium. Thus we may have as an end-stage, anatomical dilatation epithelialized without infection or retention of secretion, and thus no clinical bronchiectatic disease.

### SUMMARY

1 A study has been made to determine the efficacy of inhalation therapy in bronchial infection. To rule out spontaneous remission, improvement by medical treatment, and the production of the effect by a blood level of penicillin the following criteria were used in selection of cases:

- a There must be definite bronchographic evidence of bronchiectasis
- b There must be a history which is definitely of this type of infection for a long period of time
- c All of the patients should have been previously treated by all other methods of medical treatment including bed rest, postural drainage, sulfonamides by mouth and penicillin by injection

2 Forty-two patients satisfying these criteria were treated over a period of two years. All of the patients have been followed for at least 1 year.

3 Of the 42 patients there were 19 cases of complete disappearance of symptoms, 14 cases of marked improvement in symptoms and general condition, although some symptoms remained, and 8 cases in which no clinical improvement could be found. Recurrence of symptoms with an entirely new bacterial flora as indication of new infection was the rule rather than the exception.

4 The concentration of penicillin per c.c. in the nebulized solution did not appear to be an important factor *per se*. The sensitivity of the organism to penicillin was the most important factor in the determination of the result.

5 Inhalation therapy appears to be a definite method of treatment with a definite effect upon bronchial disease. Its efficacy is limited by the effectiveness of the chemotherapeutic agent used.

6 Continued medical supervision and customary means of treatment including postural drainage remains an essential element in the treatment of chronic bronchial infections.

### RESUMEN

1 Se ha llevado a cabo un estudio con el objeto de determinar la eficacia de la terapia de inhalación en la infección bronquial. Para eliminar la remisión espontánea, la mejoría debida al trata-

miento médico y la producción del efecto por el nivel sanguíneo de penicilina, se observaron los siguientes requisitos en la selección de casos

- a Deben existir pruebas broncográficas bien definidas de bronquiectasia
  - b Debe existir una historia por un largo periodo de tiempo que es definidamente de este tipo de infección
  - c Todos los pacientes deben haber sido tratados previamente mediante todos los otros tratamientos médicos, inclusive del descanso en cama, la canalización por postura, las sulfonamidas por la boca y la penicilina por inyección
- 2 Se trató por un período de dos años a 42 pacientes que cumplieron estos requisitos. Se ha observado a todos los pacientes por un período de un año por lo menos

3 De los 42 pacientes hubo 19 casos en los que los síntomas desaparecieron por completo, 14 casos de marcada mejoría de los síntomas y de la condición general, aunque quedaron algunos síntomas, y 8 casos en los que no se notó ninguna mejoría clínica. El retorno de los síntomas con una flora bacteriana enteramente distinta, indicativa de una nueva infección, fue la regla más bien que la excepción

4 La concentración de penicilina por centímetro cubico en la solución pulverizada no pareció ser de sí mismo un factor importante. El factor más importante para determinar el resultado fue la sensibilidad de los organismos a la penicilina

5 La terapia de inhalación parece ser un tratamiento que ejerce un efecto bien definido sobre la enfermedad bronquial, aunque limita su eficacia la efectividad del agente quimioterapéutico usado

6 La supervigilancia médica prolongada y los métodos usuales de tratamiento, inclusive la canalización por postura, continúan siendo elementos esenciales en el tratamiento de infecciones bronquiales crónicas

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## Discussion

JAMES S. EDLIN, M.D., F.C.C.P.

*New York, New York*

This subject that Dr. Levine presented is of intense interest to all physicians and especially to those engaged in the practice of diseases of the chest. With the increase in our knowledge of bronchial diseases and with the increase in diagnosis of unsuspected cases by the use of mass x-ray surveys we have found the problem of bronchial infections to be of extreme importance.

During the years of 1944 and 1945 I had the opportunity, in association with Drs. Sydney Bassin, I. D. Bobrowitz, and J. Stanley Woolley, to perform studies on a group of cases of bronchiectasis at St. Clares Hospital, New York City, and the Municipal Sanatorium, at Otisville, New York. The results of these studies were published in the *New England Journal of Medicine* on January 31, 1946. I should like to present a summary of our work and our conclusions which I believe you will find interesting in connection with the topic that was presented today by Dr. Levine.

"Although penicillin therapy cannot alter the irreversible destructive changes in bronchiectasis, the findings in 12 cases of severe bronchiectasis treated with penicillin suggest the possibility of control of bronchiectasis and a means of preoperative preparation for lung resection because of bronchiectasis.

Patients ranged in age from 16 to 30 years and included 10 men and 2 women. Seven patients were followed for 1 to 6½ months after treatment, 2 were not followed, and 3 were still being treated (as long as 16 or more weeks).

Diagnosis was made in all cases by lipiodol bronchograms. There were 33 bronchiectatic lobes in the 12 patients, with marked secular involvement in 19, moderate involvement in 3, moderate cylindrical and varicose dilatations in 6, slight cylindrical enlargement in 5, and atelectasis in 2. Symptoms had persisted from 4 to 24 years, more than 10 years in all but 2 patients. One patient had a coexistent tuberculosis. Sinus involvement was evident in 2 cases.

Sputum examinations were made before, during and after treatment. Gram stained smears were made of 24-hour collections of each specimen. Cultures were done occasionally. Sputum was purulent in all cases and was characterized by a foul odor in all but 2 cases. Both gram positive and gram negative organisms were present in all smears, the gram positive predominating. The number of organisms present was proportionate to the purulence of the sputum.

Penicillin was administered intramuscularly only in 1 patient (100,000 units daily to a total of 550,000 units in 5½ days), intramuscularly and intratracheally in 1, intratracheally only in 4, inhalation only in 3, and intratracheally and by inhalation in 2

Postural drainage was used 2 or 3 times daily throughout hospitalization. Intratracheal penicillin was administered by the supraglottic method after topical cocaineization. In 1 case an intratracheal catheter was used.

The patient treated intramuscularly showed a penicillin sputum concentration of 0.4 U/cc, while blood levels ranged from 0.2 to 0.4 U/cc. 1 patient receiving 1,000,000 units intratracheally over a period of 10 days, showed a penicillin sputum titer of 284 U/cc. Three patients receiving 1,000,000 units intratracheally for 4 days showed sputum concentrations of 831,552 and 159 U/cc respectively, and blood levels of 0.1, 0.25, and 0.45 U/cc respectively. Penicillin excretion did not persist as long as in the patient receiving therapy for 10 days. A subsequent patient receiving 1,500,000 units intratracheally over a period of 30 days showed a sputum concentration of 101 U/cc and blood levels of 0.1 to 0.25 U/cc. Results were not as good as in the patient treated for 10 days.

Inhalation therapy with 1,500,000 units in 30 days resulted in an average sputum concentration of 13 U/cc, and blood levels of 0.0 to 0.2 U/cc. Therapeutic results were, however, evident. A total of 4,000,000 units administered in 60 days gave a sputum concentration of 86 U/cc.

All patients showed a decrease in the amount of sputum, a lessening of odor, disappearance of all gram positive organisms (7 patients) and a decrease in gram negative ones during treatment. The effect was more rapid with intratracheal administration (2 to 4 days) than with inhalation (a week or two). When penicillin was stopped, these symptoms recurred after periods of a few days to several weeks, but not to the same degree as before treatment.

We concluded that although results with intratracheal administration were more rapid, the inhalation method may be preferable because of simplicity of administration and the long period of treatment required. We therefore suggest that intratracheal instillations be used initially and followed by inhalation therapy. Therapy must be continued for long periods and may need to be repeated at intervals indefinitely. The results may be elimination of bacterial infection and expectoration with ensuing repair.

For preoperative preparation of patients with bronchiectasis, a brief intensive course of penicillin intratracheally—100,000 units daily—is recommended."



## Discussion

ARTHUR M OLSEN, M.D

*Rochester, Minnesota*

In the brief time allotted me I should like to summarize our experience at the Mayo Clinic with the aerosol therapy of bronchiectasis I think you will agree that our results tend to substantiate the two major conclusions reached by Dr Levine, namely, first, that aerosols are effective in the treatment of chronic bronchial infections and, second, that the organisms present in the secretions must be sensitive to the antibiotic agent

Our methods of treatment were quite similar to those employed by Dr Levine Eighty-six patients who had proved bronchiectasis have been treated at the Mayo Clinic by means of aerosol therapy In forty-six cases, the method was used as a means of preparing patients for pulmonary resection The remaining forty patients had bilateral nonsurgical bronchiectasis All eighty-six patients received treatment with penicillin aerosol A very striking reduction in the volume of pulmonary secretions or complete relief occurred in slightly more than 50 per cent of the cases In twenty-seven cases combined streptomycin and penicillin aerosols were administered after a period of treatment with penicillin aerosol only In 90 per cent of these cases there was a striking reduction of the volume of sputum

Periods of treatment in the surgical group varied from four days to four weeks In the nonsurgical group aerosol therapy was administered for two to eight weeks Most of the patients used penicillin sodium in a concentration of 10,000 units per cubic centimeter and nebulized 200,000 to 300,000 units daily Careful bacteriologic studies were carried out including in vitro tests of sensitivity to penicillin and streptomycin Streptomycin was used only in cases in which gram-negative organisms were predominant in cultures The daily dosage of streptomycin varied from 500,000 to 1,000,000 units daily Usually we mixed 200,000 units of penicillin sodium and 500,000 units of streptomycin hydrochloride in 20 to 30 c c of physiologic salt solution

Recurrences following cessation of therapy were common Many of our patients are continuing penicillin nebulization on a modified scale at home in order to remain free of sputum Devices which provide air pressure can be employed instead of compressed oxygen and are equally effective

The development of bacterial resistance to penicillin and streptomycin is likely to be a major problem in antibiotic therapy It

is my impression that gram-negative bacteria become more readily resistant to streptomycin than do gram-positive organisms to penicillin. In vitro tests have demonstrated that resistant bacteria appear in sputum cultures of some patients after periods of treatment with penicillin and streptomycin.

In the medical treatment of bronchiectasis it should be borne in mind that therapy is directed against a complication rather than the primary bronchial dilatation. Although aerosol therapy may be effective in reducing the volume of pulmonary secretions in bronchiectasis, recurrence of symptoms is common. With the exception of pulmonary resection, no treatment can cure bronchiectasis.

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# Routine Chest Roentgenograms of Hospital Admissions\*

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DIANA OLGA DUSZYNSKI, M.D.

*Buffalo, New York*

Our interest in obtaining a chest roentgenogram on all admissions to the Meyer Memorial Hospital was stimulated by the fact that we were finding many more early tuberculous infiltrates among our student nurses than the law of averages should allow. We have a rather large tuberculous service in the hospital but this did not seem to be the source of infection. The most logical assumption was that the girls were being infected on the general non-contagion wards by unsuspected tuberculous patients. This impression was strengthened by the work of Farber and Clark<sup>1</sup>. In this paper it was shown that there are many cases of tuberculosis in the hospital wards, who enter for unrelated complaints and may be on the service for long periods without their tuberculous lesions being discovered. Such patients are frequently infectious and we believe, that they are the chief source of tuberculosis among the nursing staff. They are also, of course, a danger to the other patients as well as to the doctors, medical students and other hospital personnel.

The best way to eliminate a large percentage of these unrecognized cases we believe, is to take a chest roentgenogram on every patient admitted to the hospital before they are sent to their room. After studying the various available methods of accomplishing this, it seemed to us that the best solution was to utilize the apparatus making a set of stereoscopic 4 x 5 inch miniature chest radiographs on a 4 x 10 inch film. The standard 14 x 17 inch chest film is too expensive and too difficult to process and handle when a large volume of work is to be done. Thirty-five mm film was considered. Here the reported accuracy is slightly less than with the method chosen. The films must be magnified and there is the element of eyestrain which becomes important when large numbers are to be studied. This is said to be a rather serious factor with these very small films.

On the basis of this reasoning, we chose the photoroentgen unit, which was installed in a room directly across the corridor from

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the Admission Department This room is so arranged that we have the tube set at exactly the right distance from the unit and at the correct angle The tubestand extends from the floor to the ceiling It is mounted on a rotating pedestal and not on a track This permits only rotation of the tubestand which in such a room is a distinct advantage It eliminates all tracks and rails which are always in the way It makes centering more accurate At an angle of  $45^{\circ}$  from the photoroentgen unit we placed a 14 x 17 inch casset holder so situated that by swinging the tubestand through this small angle to a catch position it is properly centered to make a 6 foot roentgenogram on the standard size film The tube in this position can also be raised sufficiently to allow us to take a 6 foot film on patients lying on carts In a general hospital there are several admissions daily who are unable to sit up and such an arrangement is important if these people are to be x-rayed

With the room so arranged, the technical problems of doing the work are not great We find that we can do all admission chests as well as the routine hospital chest work in this one room Special studies are of course done in the regular x-ray Department The technician who formerly was occupied constantly with chest work in the x-ray Department is now assigned permanently to the photoroentgen room during the day In order to make the service fairly continuous, we keep this room open until eleven o'clock at night which requires the services of an extra technician There are very few admissions between eleven P M and 8 30 A M Those who do come in during these hours are sent to the x-ray room the next day if their condition permits

As our experience with the photoroentgen method has increased, we have been pleased with the quality of films We have gradually been able satisfactorily to examine a larger and larger number of patients We are also able to obtain good lateral and oblique stereoscopic views of the average size patient on the miniature film In the beginning, all lateral and oblique studies and all large patients were examined on the large films

The detail shown in the small films is striking It is such that most inexperienced observers over-read them Lesions which are small and not particularly dense and easily overlooked on the large films, are usually sharp and clear-cut in the stereoscopic small films

We have no satisfactory explanation for the remarkable detail shown by this method It appears however to be the result of a combination of physical factors In the first place, the penetration as expressed in peak kilovoltage is extremely high Our chart calls for all exposures to be made between 85 and 100 P K V The second factor is the grid We have had a stationary fine grid built into

our unit so that it must always be used. This cuts out much of the scatter-ray and increases detail in the same way that the Bucky diaphragm does in the ordinary radiograph. The third factor which appears important is that this is a purely photographic process, using a single emulsion film with different characteristics than the usual x-ray film. Full and complete development of the film by the time, temperature method is also essential.

With these factors operating, the technique is quite critical and demands constant attention. This means that the radiologist in charge must always be on guard for poor quality films so that the cause can be established and corrected immediately. Poor technique renders the examinations worthless. We are convinced that a poor x-ray examination is misleading and worse than none.

In view of the excellent detail and quality of small films, we now rarely require a check on lesions with the large films. We prefer frequent studies with the small stereoscopic pair. Our follow-up studies combined with the laboratory and clinical findings seem to bear out our x-ray conclusions.

Our experience with this type of chest radiograph can best be summarized by means of a chart. The first fact noted is that about 90 per cent of all our chest patients are examined by the small film method only. Practically all types of chest lesions can be satisfactorily studied by this method. It need not be considered as purely a survey instrument, but as an apparatus of great value to the general hospital x-ray department.

The most important figure to be considered is the large number of unsuspected tuberculous lesions discovered by x-ray. This figure includes only cases which are admitted to the hospital or clinic with no suspicion of tuberculosis noted by the clinicians. If there is any suspicion of the tuberculous lesion, it is not included in this group. The uncorrected figure for unsuspected tuberculosis in those patients never before seen in the x-ray department is 3.7 per cent, a figure which is rather high. It is, of course, based purely on the appearance and any lesion suspected of being tuberculous is included. When the figure is corrected by including only those actually proved by finding a positive sputum or by post mortem examinations, it is 1.8 per cent.

In one subdivision of this series (3,000 examinations), 63 cases of unsuspected tuberculosis were discovered in the group of patients never before seen in the x-ray department. Of this 63, only 49 charts were available for study. Review of the 49 cases shows that 10 per cent did not have active tuberculosis. There are 5 such patients, 4 had adequate sputum studies, all negative and the fifth patient was necropsied and had anthracosis plus interstitial pneumonia.

9 cases had positive sputum,  
8 cases were proved at necropsy,  
5 cases were immediately transferred to the tuberculosis division  
and there proved

This is a group of 22 cases or 45 per cent definitely proved as tuberculous

Another group of 22 cases or 45 per cent were inadequately studied up to the present. This group is composed of patients who absconded, were court cases and those who preferred to return to their private physicians. We have no way of knowing how many of these will ultimately be proved tuberculous but feel that at least 70 or 80 per cent is a conservative figure.

Based on the above figures 18 per cent of the new patients never before seen in this x-ray department have actually proved tuberculous. Only a portion of the patients could be properly and adequately studied. In our opinion, at least 25 per cent of our new patients have pulmonary tuberculosis. The chart also demonstrates the various types of nontuberculous lesions noted in the group of patients studied. An attempt has been made to show which type of lesion requires the use of larger films to substantiate the diagnosis. It is noted that the distribution is fairly even.

Our greatest problem has been and probably will remain that of deciding what constitutes the minimal changes in the lung parenchyma which may be considered evidence of active tuberculosis. We have been calling every lesion tuberculous which is in any way suspicious. Frequently lesions are seen, which on the first x-ray examination bring up the differential diagnosis of tuberculosis or one of the following: resolving pneumonia, atypical pneumonia, bronchopneumonia, lung abscess, bronchiectasis, bronchogenic carcinoma, occupational fibrosis, etc. When such a problem arises, we note that the appearance suggests one of the above named lesions but that x-ray alone cannot rule out tuberculosis at the present time, which must be done by clinical and laboratory studies. Such patients are handled as though they were tuberculous until a diagnosis has been established. If we are to accomplish our purpose of eliminating tuberculous patients from the general wards this attitude must be maintained. It is a constant source of surprise to us how large a percentage of these questionable cases are eventually proved to be tuberculous.

### CONCLUSIONS

If all the general hospitals adopt the principle of making x-ray studies of the chest on every admission and calling every suspicious lesion tuberculous, until proved otherwise, a large number of tuberculous patients will be found. It is a protection against the

## X-RAY STUDIES OF THE CHEST

From July 8, 1944 to March 12, 1945

Total Examinations	10,000	Patients with Lesions	4,329
Photoroentgen Examinations	9,486	Patients with no Lesions	5,671
Conventional Examinations	766	New Patients (X-ray)	4,671
Combined Method	262	Revisits (X-ray)	5,329
Total Hospital Admissions	5,983	Total New Patients (Hospital)	2,245

Lesions Diagnosed by X ray	X-Ray Exams	Conven- tional Exams	New Patients	Revisits	Total
Pulmonary Tbc , Unsuspected	235	9	173	67	240
Pulmonary Tbc , Grade I			115	42	157
Pulmonary Tbc , Grade II			43	16	59
Pulmonary Tbc , Grade III			18	6	24
Pulmonary Tbc , Grade I (total)	604	15	178	436	614
Pulmonary Tbc , Grade II (total)	655	29	100	584	684
Pulmonary Tbc , Grade III (total)	481	24	86	415	501
Tuberculosis, primary	81	18	29	62	91
Mediastinal Lymph Node Tuberculosis	17	4	6	12	18
Basilar Tuberculosis	3	2	2	2	4
Miliary Tuberculosis	5		1	4	5
Tuberculoma	4	1		5	5
Thoracoplasty	103	7	2	108	110
Pneumothorax (Therapeutic and Spontaneous)	324	34	28	316	344
Pleural Effusion (All Types)	396	41	124	297	421
Pulmonary Congestion—Cardiac	244	11	150	102	252
Empyema	72	42	16	74	90
Pleurisy (Plastic)	729	72	252	513	765
Calcified Pleural Plaque	12	2	5	8	13
Pneumonia—Lobar	260	62	143	152	295
Pneumonia—Broncho	48	35	42	40	82
Pneumonia—Atypical	17	4	9	10	19
Atelectasis (Massive and Partial)	7	4	4	5	9
Lung Abscess	10	4	3	9	12
Gangrene of Lung	2	2	1	3	4
Cystic Lung Disease	2	4	1	2	3
Bronchiectasis	24	3	6	20	26
Occupational Fibrosis	22	2	2	22	24
Pulmonary Fibrosis following X-ray Treatment	4	2	4	2	6
Pulmonary Emphysema	488	19	275	230	505

Lesions Diagnosed by X ray	X Ray Exams	Conven- tional Exams	New Patients	Revisits	Total
Pulmonary Infarcts	5	2	4	2	6
Miliary Leukemic Infiltrates	1		1		1
Bronchogenic Carcinoma	38	32	9	41	50
Neurofibroma	1	2	1	1	2
Benign Lung Tumor	4	4	1	5	6
Metastatic Carcinoma in Lung	10	2	3	8	11
Hodgkin's Disease	1			1	1
Mediastinal Tumor	2	2	1	1	2
Herniation of Mediastinum	3			3	3
Heart Disease—Congenital	2	1		3	3
Heart Disease—Rheumatic	46	5	24	25	49
Heart Disease—Enlarged	867	88	559	384	943
Aortitis	190	19	133	73	206
Aneurysm—Aortic	19	11	10	13	23
Dextrocardia—Congenital	4		2	2	4
Pseudodextrocardia	6	1	4	3	7
Pericarditis	2	2		3	3
Enlarged Thyroid	32	5	22	12	34
Subdiaphragmatic Abscess	1	2		3	3
Diaphragmatic Hernia	1	2	1	1	2
Eventration of the Diaphragm	4		3	1	4
Perforated Viscus	6		6		6
Subcutaneous Emphysema	6	6	5	7	12
Kyphosis and Scoliosis	31	3	17	17	34
Erosion of Vertebrae	1		1		1
Fractures (Ribs and Clavicle)	26	2	20	8	28
Rib Spurs	1		1		1
Fused Ribs	3		3		3
Bone Tumor of Rib	2		1	1	2
Tuberculous Osteomyelitis of Ribs	4	1		4	4
Metastatic Carcinoma in Ribs	9	5	3	10	13
Foreign Body in Dorsal Vertebra	1	1	2		2
Rickets (Ribs)		1	1		1
Cold Abscess (Dorsal Spine)		1	1		1
Extrathoracic Mass	1			1	1
Foreign Bodies in Chest Wall	1		1		1



high tuberculous incidence among the hospital personnel, especially nurses This is feasible now that a satisfactory method of miniature chest radiography has been developed The miniature films are sufficiently good that they can also be used for a large percentage of the usual original chest x-ray studies as well as follow up examinations

It will be a great step forward in the battle against tuberculosis if all general hospitals adopt this method and attitude The cost of such a program will soon be cancelled by the low cost of film and labor as well as the economic benefit to the community in general

### CONCLUSIONES

Si todos los hospitales generales adoptaran el principio de llevar a cabo estudios radiográficos del tórax de todas las admisiones y de diagnosticar como tuberculosa toda lesión sospechosa hasta que se probara lo contrario, se descubriría un numero notable de enfermos tuberculosos Sería ésta una protección contra la elevada frecuencia de la tuberculosis entre el personal del hospital, especialmente las enfermeras Esto es factible ahora que se ha desarrollado la técnica satisfactoria de tomar radiografías torácicas en miniatura Las películas en miniatura son lo suficientemente buenas para que se puedan usar también en un alto porcentaje de los usuales estudios radiográficos torácicos originales y en los exámenes subsiguientes

Si todos los hospitales generales adoptaran este método y esta actitud, esto sería un paso muy avanzado en la lucha contra la tuberculosis El costo de este programa se cancelaría pronto por el pequeño costo de las películas y de la labor y por el beneficio económico que acarrearía a la colectividad en general

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### Discussion

DONALD McKAY, M.D.

*Buffalo, New York*

I have, for a long time, had a great interest in case finding methods and I'm proud that this report comes from the same Institution with which I have been associated for many years The need for this survey work is quite apparent This need has been strikingly demonstrated, too, by the Induction Centres of the Armed Forces About 1 per cent of rejectees find their major defect in a pulmonary lesion Since a large percentage were unknown cases and coming from an age group which, so to speak, might

be considered the cream of the crop, it is easy to visualize the benefits of such a program

In a fairly large defense industry in which we routinely x-rayed all prospective employees, we found the incidence of pulmonary lesions to coincide closely with that of prospective members of the Armed Forces. In our plant most of the cases were previously unknown. The known case of pulmonary disease usually avoids seeking employment where routine x-ray inspections are a requisite. We have felt the effort to maintain a personnel free of infectious disease was worth the effort. Many having pulmonary lesions were eventually employed, and rightly so, once their lesion was considered apparently cured, arrested or apparently arrested and provided the disease was not too extensive for a good light-work-risk. In Buffalo we recently surveyed a group of 12 small industries, taking 1254 films. These results bear out the assumption that the known tuberculous patient tends to avoid plants where pre-placement films are a rule. And, of course, such a survey indicates the value of a health program from both the standpoint of management and employees.

These analogies are noted for comparison with routine hospital admissions. But are they analogous? Those examined for the Armed Forces or applying for an industrial position are for the greater part a selected group while persons applying for hospital admission are ill. Should we not expect a greater percentage to show pulmonary changes? The admissions to the Meyer Memorial Hospital or to any other large municipal hospital come mostly from the low income group of citizens and therefore are liable to show more pulmonary lesions on such a survey, since tuberculosis still finds its greatest number of victims among individuals on low economic levels where poor dietary habits, lax hygienic practices and unsuitable housing conditions prevail. However, there is already evidence to show that the admissions of an ordinary General or Private Hospital are apt to present a greater than expected percentage of pulmonary lesions. It is well known that tuberculosis may be ushered in by gastrointestinal complaints. Some of these pass through abdominal diagnostic procedures before the diagnosis is recognized. Some tuberculosis is ushered in by laryngeal complaints and these too have a local investigation or even extirpation of the tonsils before a correct appraisal is obtained. Cases of ischio-rectal abscess may have a tuberculous etiology, with pulmonary findings of varying intensity. These may serve as examples of patients having symptoms and signs remote from the original disease focus. If such a hospital maintains a Neuropsychiatric Service, a greater than normal rate of tuberculosis complications may be expected.

So if routine chest surveys are a valuable procedure for the Armed Forces and Industry, it would appear that they should be still more valuable in general hospital practice. Considering our experience at the Meyer Memorial Hospital, we are strongly convinced of the need for this service if only for the protection of the Hospital and University Personnel. For years I found the Mantoux reactors among nurses classes rise from 20 to 30 per cent on admission to Training School 50 and 60 per cent at the end of the first year of training, in spite of the fact that no student nurses were assigned to the Tuberculosis Service until at least one year's training had elapsed. Delayed diagnosis of tuberculosis were being constantly made in all other services. In the interim, these patients were a constant hazard to their attendants who treated and cared for presumably pneumonias, laryngitis, gastro-intestinal disorders, ischio-rectal abscesses, dementias, etc. The problem is less in a general or private hospital only to a degree already indicated but the problem is still present and worthy of solution. Initial cost charges, maintenance and increase in personnel needed could be met by a small fixed fee such as already used in hospital practice. For value received I think the patient body would get a great deal more than it derives from some other common routine procedures and certainly the information received by the Medical and Surgical Staff would be most useful, and the protection of the attendants against otherwise unrecognized cases of tuberculosis would be of great value.

It is gratifying to note that Dr. Scatchard does not attempt to evaluate all his suspicious cases. This procedure calls for the observation of the attending physician, various laboratory procedures such as direct sputum smears, cultures, guinea pig inoculations, sedimentation rates, differential blood counts, the efforts of the bronchoscopist and often the skill of the thoracic surgeon. True a large percentage of pulmonary lesions noted may be non-infectious or well healed but in our modern concept of tuberculosis all cases should be as correctly appraised as possible and advised adequate observation and treatment.

The chart indicates the great value of the routine x-ray examinations in the diagnosis of various other pulmonary lesions, such as the pneumonias, bronchogenic carcinoma, lung abscess, etc., all of which at times may present symptoms and signs not apparently related to the respiratory system. The early discovery of disease conditions in the lung by the use of the routine survey may save much precious diagnostic time and save for surgical procedures many cases which might otherwise have drifted into the inoperable group.

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# The Surgical Treatment of Bronchial Adenoma\*

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A concept that is bronchial adenoma, its growth potential, natural life history, histopathology, separation from carcinoma, and differentiation from other polypoid tumors has been described in previously published papers<sup>1-5</sup> Part of the controversy in this subject was beautifully expressed by Brunn at our tumor conference March 10, 1941 "Not so much was known about adenoma until recently, we do not know the full natural history of this disease even now There is some dispute first as to malignancy Some people think they are malignant, we think they are not In some cases we have left some tumor in, and two years have elapsed but nothing has happened to them We think there are varieties that are malignant so that you have to be very careful what you say about these things, and be very careful of accepting other men's opinions because they may be dealing with another type tumor The whole subject is a little obscure and a whole lot has yet to be learned"

Although published reports<sup>6-10</sup> containing isolated instances of regional or distant metastases had been made, we had not observed any such metastases in our cases We fully expected, however, that sooner or later metastases would appear but to date they have not Other authors have indicated that bronchial adenoma metastasizes to the regional lymph nodes Chamberlain<sup>11</sup> found metastases in fifty per cent of ten specimens examined, six of these were surgically removed by lobectomy and one by pneumonectomy Graham<sup>12</sup> has repeatedly stressed the potential malignant qualities of bronchial adenoma (mixed tumor) He, Anderson,<sup>13</sup> Clerf,<sup>14</sup> and Bigger<sup>15</sup> reported metastases and malignant degeneration Crafoord<sup>10</sup> indicated that adenomata are a complex group (1) clinically and histologically benign, (2) clinically benign but histologically malignant He, like Graham, relates the behavior of bronchial adenomata to that of mixed tumors of the salivary glands

The opinions as to benignancy or malignancy of bronchial adenoma are due in the main to a failure to agree upon a basic

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histological diagnosis Maier<sup>16</sup> has separated twenty-five to thirty cases of so-called adenomas reported in the literature which arise either close to the carina or in the tracheal wall. In these, there has been a somewhat higher incidence of malignant characteristics than among other adenomas. Histologically, the glandular formation is somewhat more striking than in most other adenomas. He believes Anderson's<sup>13</sup> case of metastases to the liver is one of these variations. The mortality rate has been much higher in this variety than in ordinary adenoma because patients die from tracheal obstruction. We have observed a cylindroma arising in the right stem bronchus which infiltrated the wall of the trachea and, in five years after bronchoscopic diagnosis, produced death due to tracheal obstruction. Beyond doubt, several reported mixed tumors do not fit the histological descriptions laid down for adenoma. Tendency not to separate cylindroma would give to adenoma an increased invasiveness found in the former tumors but not present in our adenomas. Other types of malignant tumors may simulate adenoma because of their occasional long duration, i.e., epidermoid carcinoma,<sup>17</sup> adenocarcinoma,<sup>18</sup> leiomyosarcoma,<sup>3</sup> and lymphangioendothelial sarcoma.<sup>3</sup> Some of these have had long clinical histories but their histology is so distinct as to separate them from adenoma. Small cell carcinoma<sup>19</sup> may simulate adenoma in the bronchoscopic biopsy but their duration is usually very short and like the above-mentioned tumors they metastasize distantly. We believe that with the rigid adherence to the histological criteria set forth by Jackson,<sup>20</sup> Wessler,<sup>21</sup> and others<sup>3, 5, 22, 23</sup> for the diagnosis of adenoma the number of patients exhibiting metastases will be materially decreased. Furthermore, the pressure necrosis and local infiltration together with the appearance of multinucleated cells, "Durchwanderung" into the capsule and contiguous extension to one mediastinal lymph node are not evidences of increased rate of growth nor should these findings designate the tumor as undergoing malignant degeneration. These latter findings are apt to occur in tumors older than 15 years.

We believe that bronchial adenoma should be regarded as a very slow growing epithelial tumor which is locally invasive, clinically benign, but apparently capable in rare instances of becoming malignant. Due to its location, it usually produces serious disabling symptoms of suppuration if not death. Total removal of the tumor together with removal of the distal suppurating lung is the ideal treatment. To accomplish this pulmonary resection is the treatment of choice in approximately ninety per cent of the patients. In the absence of suppuration bronchotomy may be indicated. Resection accomplishes both the complete removal of the tumor and the suppurating lung. Unlike carcinoma, lobectomy

rather than pneumonectomy is sufficient if it includes all the tumor and the suppurating lung. Mediastinal lymph node dissection is rarely necessary. Preoperative preparation consisting of penicillin, sulfamerazine, transfusion, rest, high caloric, high vitamin diet, and release of bronchial obstruction by endoscopic therapy, is important to keep the operative mortality low. Operation should not be performed during an exacerbation of the pulmonary infection or immediately after a large hemoptysis. Several weeks or months may be utilized to raise the patient's preoperative condition to the optimum.

In general, the technique of lobectomy for bronchiectasis with hilar ligation of vessels and primary ligation and suture of the bronchial stump is the method of choice. Certain peculiarities of these tumors must be considered, namely, the enlargement of the bronchus due to the tumor within it, the location close to the stem bronchi, the tendency for the tumors to project towards the trachea, and the adhesive pleuritis associated with a long-standing infection. The enlargement of the bronchus disturbs the relation of the vessels so that they must be dissected out with great care at the hilum. The position of the tumors makes it necessary to amputate the lobe close to the stem bronchus. However, at times the incision in the bronchus may be made below the tip of the endobronchial tumor so that a slightly longer bronchial stump is obtained. The adhesive pleuritis frequently involves the pericardium and the adhesions may contain fairly large blood vessels. These adhesions should be ligated when they are cut.

Pulmonary resection is indicated in approximately 90 per cent of patients in order to remove all the tumor and suppurating distal lung. As stated by Chamberlain<sup>11</sup> and Adams,<sup>24</sup> pulmonary resection is preferable to bronchoscopic removal because bronchoscopic removal can only safely remove all the tumor in the relatively rare instance where the pedicle is small, the tumor easily accessible and wholly contained within the bronchus.

Bronchoscopy is indicated in all cases, to define the location of the tumor and to obtain a biopsy. Further bronchoscopic removal is indicated to re-establish the aeration of the distal obstructed lung in preparation for pulmonary resection, in those tumors which involve the trachea, and as a definitive treatment in patients over the age of 60 or in those who are poor surgical risks. In some patients it will be very difficult to determine and it may take several years to discover evidence that all the tumor has not been removed and that endomural or extrabronchial portions remain. When this occurs, the bronchial mucosa will have grown over the stump covering the endomural portion which is seen as a flat elevation covered with spidery blood vessels. Both hem-

orrhage and recurrent pulmonary suppuration may continue. Biopsies from such an area will usually show only fibrous tissue (Case 10, Fig 2).

Pulmonary resection is apt to be extremely difficult and give an increased surgical mortality in those patients in whom bronchial obstruction and distal suppuration in an entire lung has persisted for more than 15 years, because resection through dense pleural symphysis, accompanying lymph node hyperplasia at the hilum, and increased collateral circulation aid and abet the hazard of operation. Continued loss of proteins and lowered cardio-respiratory reserve also add to the surgical risk. Therefore we have not urged pulmonary resection in that group of patients in whom bronchoscopic removal appears impossible but who probably possess carnified lung with suppuration. They usually have had surgical drainage of empyema and pulmonary abscess, which has contributed to the intensity of the pleural symphysis. We have several such patients with more than 10 years duration since bronchoscopy who are able to work at sedentary occupations and have shown no signs of malignant degeneration. It is our opinion that early lobectomy would have been the best treatment, but they were discovered too late in their clinical course. In addition to their pulmonary suppuration, they also had large doses of x-ray therapy, another factor adding to the surgical risk.

It is the purpose of this paper to present ten consecutive cases

FIGURE I—DURATION OF ADENOMA TREATED WITH PULMONARY RESECTION

Case	Years since pulmonary resection	Years since bronchoscopic biopsy	Years since onset of symptoms	Type of Resection
1 J Gh	1/12	2/12	1½	L Pneumonectomy*
2 H.L	7½	15	21	L Pneumonectomy
3 F J	7½	7½	14	L Lower Lobectomy
4 C.R	7½	7½	10	L Pneumonectomy
5 G D	6½	7½	17	L Lower Lobectomy
6 E.A	5	5	15½	R Middle Lobectomy
7 J G	6½	7	7½	R Upper Lobectomy
8 I S	4	4½	5	L Pneumonectomy
9 D.M	4	4	5½	R Lower and Middle Lobectomy
10 A.B	3/12	7	34	L Lower Lobectomy Bronchotomy

\*Only death

of bronchial adenoma treated with pulmonary resection which have been followed up one hundred per cent (Fig 1) The duration since operation is twenty-four days (this case being the only surgical mortality), seven and one-half years, seven and one-half years, seven and one-half years, six and one-half years, five years, seven years, four years, four years, and three months respectively In no case has any metastasis occurred, although tumor was left in the bronchial stump for seven and one-half years in two cases and for four years in one case This long duration and benign behavior of tumor left in the bronchial stump unquestionably demonstrates the low growth potential of these tumors It is probable that we shall see evidence of recurrences of these residual tumors, but to date none has occurred Because of this low growth potential, we feel that it is worth while to conserve functioning pulmonary tissue wherever possible and to this end, in the tenth case, a technique conserving the upper lobe was utilized by combining lower lobectomy with bronchotomy This case will be described in detail (Case 10, Fig 3)

*Case 1* L.Gh, white male, aged 24 years, had his onset of illness in 1936 with cough and frequent chest colds In February 1937, the patient was treated for pneumonia After six weeks, he recovered sufficiently to return to his occupation as a mechanic The x-ray films of his chest revealed, however, that a complete clearing of the left lung never occurred The patient had a recurrence of symptoms in January 1938 X-ray films at this time revealed a shadow in the left hilus The density in the left lung increased, atelectasis of the left lung became pronounced, and bronchoscopy was performed on January 31 1938 A polypoid tumor was visualized in the left main bronchus, just proximal to the upper lobe opening The tumor almost completely filled the lumen of the left main bronchus, and was not particularly vascular The biopsy material was diagnosed epithelioma by Dr G Y Rusk

He entered the San Francisco Hospital on February 15, 1938 Examination showed him to be acutely ill, with evidence of recent weight loss His disease ran a septic course in the hospital in spite of bronchoscopic drainage of the left lung and a pneumonectomy was elected because the consensus was that we were dealing with a malignant tumor The patient's poor condition was recognized but we felt we could not improve it because of his failure to respond to treatment A left pneumonectomy was performed on February 25, 1938, through a posterior lateral incision The operation was accomplished with difficulty because of adhesions between the upper lobe and the parietal pleura The hilar structures were closed by several mass ligatures of heavy silk

Postoperative course was satisfactory for 14 days and then the operative wound broke down because of infection The bronchial stump opened up and a streptococcus empyema developed The patient expired on the 24th postoperative day Necropsy was refused

Examination of the operative specimen revealed a polypoid tumor completely filling the left main bronchus and extending posteriorly through the bronchial wall and overlying a pulmonary vein but not



involving the latter. No metastases were present in the regional lymph nodes removed. The upper and lower lobes were atelectatic and showed various stages of pneumonitis, they were not invaded by tumor. Histological diagnosis was changed to bronchial adenoma.

**Discussion** If the correct diagnosis of adenoma were made preoperatively, we would have made a more serious attempt to remove the endobronchial portion of the tumor bronchoscopically. We could have re-established bronchial drainage by this procedure, relieve infection and thus render the patient a much better surgical risk. Also, the use of penicillin both parenterally and intrapleurally, together with sulfamerazine might have prevented the postoperative infection from which he succumbed. Pre- and postoperative administration of these antibacterial agents are routine today. This is the only surgical or other mortality in this series of ten pulmonary resections.

**Case 2** H. L., a white female, 48 years of age, was seen at the University of California Thoracic Surgery Clinic in May 1931. At that time, she had a productive cough, night sweats, pleurisy, weakness and fatigue, of six years' duration. X-ray examination on May 19, 1931, showed a dense, sharply outlined, nodular shadow in the upper half of the left hilum. Bronchoscopy on May 25, 1931, showed a large white papillomatous mass with a mulberry-like surface, three centimeters from the carina, projecting into the left stem bronchus from the mouth of the upper lobe. Biopsy was interpreted as a histologically malignant tumor. Several subsequent attempts at bronchoscopic removal were made during the next 18 months. As hemangioendothelioma was the most favored diagnosis, x-ray therapy was given. In December 1932, x-ray examination showed no decrease in size of the shadow. In August 1933, the entire left upper lobe had become atelectatic, and there were old fractures of the sixth, seventh, and eighth ribs over the upper lobe. Bronchoscopy showed the tumor in the stem bronchus still unchanged. Now the histological diagnosis was carcinoma.

There was much discussion as to this diagnosis. The age, now 55, the spontaneously fractured ribs, recent weight loss and the histology all militated against a benign tumor, in spite of a duration of more than seven years since the first bronchoscopic diagnosis. Pneumonectomy was performed in one stage on September 1, 1938, with individual ligation of vessels, section of the stem bronchus above the tumor, closure of this bronchus by ligation reinforced with interrupted silk sutures, and partial removal of the mediastinal lymph nodes. On exposure, the lung was densely adherent to the second, third and fourth ribs. The tumor palpated near the hilum was thought to be malignant and invading these ribs, so they were resected with the lung.

The resected left lung showed the endo-extra-bronchial tumor to be 5 cm. in its longest diameter, completely encapsulated without extension to the ribs or the mediastinal lymph nodes. The left upper lobe was atelectatic. The lower lobe was not involved. Histologic examination of the material removed at pneumonectomy, together with a review of specimens removed at the previous biopsies, proved the tumor to be an *adenoma*. The fractured ribs contained no tumor.

Postoperative course was satisfactory and she was discharged on the 30th postoperative day. A small sinus in the wound healed up after 3 months.

*Follow-up* She is now 63 years of age, able to do housework, seven and one-half years after pneumonectomy, 15 years after bronchoscopic biopsy and 21 years after onset of symptoms

*Case 3* F J, a white female, 26 years of age, was admitted to the San Francisco Hospital on August 21, 1938 Her illness began in 1932 with wheezing and "asthma," followed by pulmonary hemorrhages, sudden in onset and termination, often occurring with the menses During the next six years the hemorrhages were replaced by febrile periods terminating with the expectoration of bloody, fetid sputum The latter became more frequent until they were occurring every three weeks at the time of her admission to the hospital

X-ray examinations showed cystic whorls behind the left border of the heart These shadows varied in appearance from time to time Repeated examinations of the sputum failed to reveal tubercle bacilli

The clinical diagnosis was tuberculosis of the lungs The patient had been treated by several physicians and bronchoscopic and bronchographic examinations had been performed without demonstrating the pathological changes

Bronchoscopy, done at the San Francisco Hospital in August 1938 showed a small polypoid tumor obstructing the mediastinal branch of the left lower lobe Biopsy proved this tumor to be an adenoma Endobronchial probing with serial selective bronchography showed bronchiectasis limited to the mediastinal segment of the left lower lobe

A one-stage lobectomy was performed on October 10 1938 The patient's convalescence was uncomplicated The portion of the tumor left in the stump was not visible through the bronchoscope one month after operation The extrabronchial portion of the tumor was 2.5 cm in diameter and extended posteriorly into the mediastinum Two lymph nodes examined showed no metastasis The surgical specimen showed cystic bronchiectasis with a normal apical segment The bronchiectasis was confined to the segments obstructed by the tumor The patient was discharged on the 16th postoperative day

*Follow-up* This woman is working and well at the age of 35, seven and one-half years after lobectomy and bronchoscopic biopsy, and 14 years after onset of symptoms

*Case 4* C R, white male, aged 48 years The onset of symptoms was in 1936, at which time the patient was treated for lobar pneumonia in the left lower lobe After recovering from this illness, the patient suffered from repeated attacks of pain in the left chest, elevation of temperature, hemoptysis and dyspnea He was first seen at the University of California Hospital on September 9, 1938 The x-ray films of the lungs revealed a faint shadow just to the left of the left border of the apex of the heart, and on the lateral film showed a definite consolidation posteriorly in the left lower lobe

Bronchoscopy was performed on September 9, 1936, and at this time a pale pink, vascular, soft polypoid tumor was seen obstructing the left stem bronchus, above the upper lobe opening The biopsy material was diagnosed adenoma of the lung, although some favored the diagnosis of carcinoma On September 12, 1938, the "remaining portion" of the endobronchial part of the tumor was removed through the bronchoscope Hemoptysis continued, and bronchoscopic examination in November 1938, indicated recurrence of the endobronchial tumor, so a one-stage

pneumonectomy was elected. The operation was performed on December 12, 1938. A posterior lateral approach was used, the entire left lung was densely adherent to the parietal pleura. Mobilization of the left lung was accomplished with difficulty, and the lung had to be removed by the tourniquet method. A careful hilar dissection was impossible. Examination of the surgical specimen showed that all the tumor had not been removed. An advanced degree of chronic suppuration was present in the lower lobe. The patient's postoperative convalescence was complicated by an empyema which was treated by aspiration, tube drainage, and later by Eloesser flap.

*Follow-up* At the age of 54 this man is doing light work, still has a small amount of drainage from his Eloesser flap seven and one-half years after pneumonectomy and bronchoscopic biopsy, and 10 years after onset of symptoms.

*Case 5* G. D., white female, aged 43 years, admitted to the University of California Hospital on May 22, 1939. The onset of symptoms was in 1929 with non-productive cough and wheezing, followed by a series of "chest colds." One year later, the first hemoptysis occurred consisting of a tablespoonful of blood twice in one week. The diagnosis of pulmonary tuberculosis was made, and the patient was sent to a sanatorium for the next two years, although the sputum was negative for tubercle bacilli. During the years 1933, 1934 and 1935, the patient was fairly well except for cough and clear sputum.

Pulmonary hemorrhages became the cardinal symptom in 1936. These occurred regularly at monthly intervals 5 to 10 days before each period, usually one cup in amount, sudden in onset, bright red, appeared without warning, and continued for the next two years. They stopped for the following nine months and then recurred more copiously than before, now with dyspnea and wheezing.

X-ray films of the chest over seven and one-half years show little change of atelectasis of the left lower lung.

Bronchoscopy in March 1939, ten years after the onset of symptoms, showed a polypoid tumor in the left stem bronchus at the level of the left lower lobe, completely filling it. Biopsy specimen was diagnosed bronchial adenoma, very vascular. In May 1939, the adenoma was partially removed through the bronchoscope. After several attempts at removal, the endobronchial portion of the adenoma was still visible. Serious hemorrhage discouraged continued bronchoscopic removal. Therefore, on January 12, 1940, a left lower lobectomy was performed with individual ligation and suture of the bronchus. The tumor lay in a cyst-like dilatation of the lower lobe bronchus and its dimensions were 4 by 3 by 3 centimeters, certainly too large to be removed bronchoscopically. Histological diagnosis was adenoma.

The postoperative course was satisfactory and the patient was discharged on the sixth postoperative day. Atelectasis of the left upper lobe and fluid required aspirations.

*Follow-up* This woman, now 50 years of age, is able to do her house work six and one-half years after lobectomy, seven and one-half years after bronchoscopic biopsy and 17 years after onset of symptoms.

*Case 6* E. A., this 26-year-old woman entered the University of California Hospital on December 31, 1940, with an onset of symptoms of weakness, fatigue, cough, sputum and hemoptysis beginning in 1931.

On arrival via ambulance, she weighed less than 100 pounds and was weakened from severe pulmonary hemorrhage. On January 3, 1941, bronchoscopy with biopsy demonstrated a bronchial adenoma projecting from the right middle lobe opening into the stem bronchus. Tomography demonstrated a large mass in the right middle lobe. The tumor was judged correctly to be too large for bronchoscopic removal.

On February 26, 1941, right middle lobectomy was performed. Hemostasis and isolation of hilar structures were difficult owing to the distorted anatomy and dense adhesions. Mass ligation of the right middle lobe hilum was done and the lobe amputated. Several sutures were placed about the stump for closure and hemostasis, distal to the ligation.

Postoperative course was complicated by bronchial fistula and empyema, which was treated by Eloesser flap drainage.

The right middle lobe was the size of an orange, completely atelectatic and contained in a dilated bronchus a large, encapsulated lobulated adenoma measuring 6 by 3 by 3 centimeters.

*Follow-up* At the age of 32 she is able to work, five years after lobectomy and bronchoscopic diagnosis, and fifteen and one-half years after onset of symptoms.

*Case 7* J. C., a white female, aged 21 years, entered the University of California Hospital for bronchoscopy July 13, 1939. Onset of symptoms only six months before, with hemoptysis. A purplish, bosselated tumor was seen in the right stem bronchus, and biopsy showed it to be adenoma. Several attempts to remove the tumor bronchoscopically failed because of severe hemorrhage. The tumor was not only too vascular but also too large for bronchoscopic removal.

On April 10, 1940, lobectomy was done. Postoperative course was complicated by empyema, treated by Eloesser flap drainage. Some pathologists reported this tumor as probably malignant. Our diagnosis was adenoma. The extrabronchial mass was 3 centimeters in diameter and made pressure upon the middle and lower lobe bronchi from the mediastinal side. Some multinucleated cells were present.

*Follow-up* This woman is now 28 years of age and is well six and one-half years after lobectomy, seven years after bronchoscopic biopsy diagnosis and seven and one-half years after onset of symptoms.

*Case 8* I. S., This white female, aged 29 years, entered the University of California Hospital on April 1, 1942. Onset of symptoms was November 1941, with severe chest cold, wheeze and bloody sputum. Bronchoscopy in March 1942, in an outside hospital disclosed a polypoid tumor in the left main stem bronchus and biopsy specimen was diagnosed epidermoid carcinoma. She entered the hospital for interruption of a six-months' pregnancy. A supravaginal hysterectomy was done.

On April 27, 1942, a left pneumonectomy was done through a posterolateral incision with individual vessel ligation, closure of the left stem bronchus above the tumor by ligation and distal suture. Postoperative course was satisfactory and she was discharged on the fifteenth postoperative day.

The surgical specimen showed a pedunculated adenoma 1 by  $\frac{3}{4}$  by  $\frac{3}{4}$  centimeter in the left main bronchus, covered by squamous metaplasia. There was a small amount of infiltration below the mucosa.

*Follow-up* This woman is well at the age of 33 years, four years after

pneumonectomy, four and one-half years after bronchoscopic biopsy diagnosis and five years after onset of symptoms

*Case 9* D M, a white female, aged 41 years, entered the University of California Hospital on April 17, 1942 Her husband, a prominent ear, nose and throat specialist, suggested her bronchoscopic examination Onset of symptoms was in December 1941, with pneumonia and right pleurisy Hemoptysis, colds and cough were present Bronchoscopy on April 16, 1942, showed a polypoid tumor in the right stem bronchus at the level of the middle lobe, histologic diagnosis of the biopsy specimen was adenoma

Lobectomy was performed on April 29, 1942, with removal of the right middle and lower lobes Dissection of the middle lobe was extremely difficult due to the adhesions about the hilum and absence of fissures After dissection had proceeded for approximately four hours, the lower and middle lobes were ligated separately with heavy braided silk and both lobes amputated Some tumor was present at the point of ligation



January 28 1938  
Postero-anterior

April 26 1939  
Postero-anterior

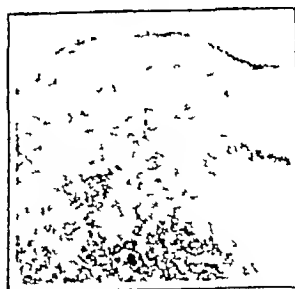
April 26 1939  
Left lateral

X-ray films showing increased atelectasis during four years The tumor is not visualized.



May 10 1939

Lipiodol instillation showing cystic bronchiectasis of left lung



April 3 1940

Bronchoscopic biopsy one year after bronchoscopy removal No adenoma seen Inflammatory connective tissue

Postoperative course was satisfactory Thoracentesis was required to remove fluid on three occasions She was discharged on the 27th post-operative day

The right middle lobe was markedly shrunk, measuring only 8 by 3 by 3 centimeters The specimen contained only a small portion of intramural tumor The right lower lobe contained bronchiectasis

*Follow-up* This woman is well and able to climb the Sierras four years after bronchoscopic biopsy diagnosis and right lower and middle lobectomy, and five and one-half years after onset of symptoms

*Case 10* A B, a white female, aged 31 years The time of the onset of symptoms in this patient is difficult to determine She was a delicate child, weighing but four pounds at birth, and only 40 pounds at the age of 11 At the age of 4, she was severely ill from "whooping cough" At the ages of 10, 12, 15, 17 and 19, she had severe "pneumonias" associated with marked dyspnea, requiring bed rest for several weeks at a time In 1929, at the age of 22, following another pulmonary infection, the first hemoptysis appeared The hemorrhages were small in amount, and continuous throughout most of that year During 1931, several "bad

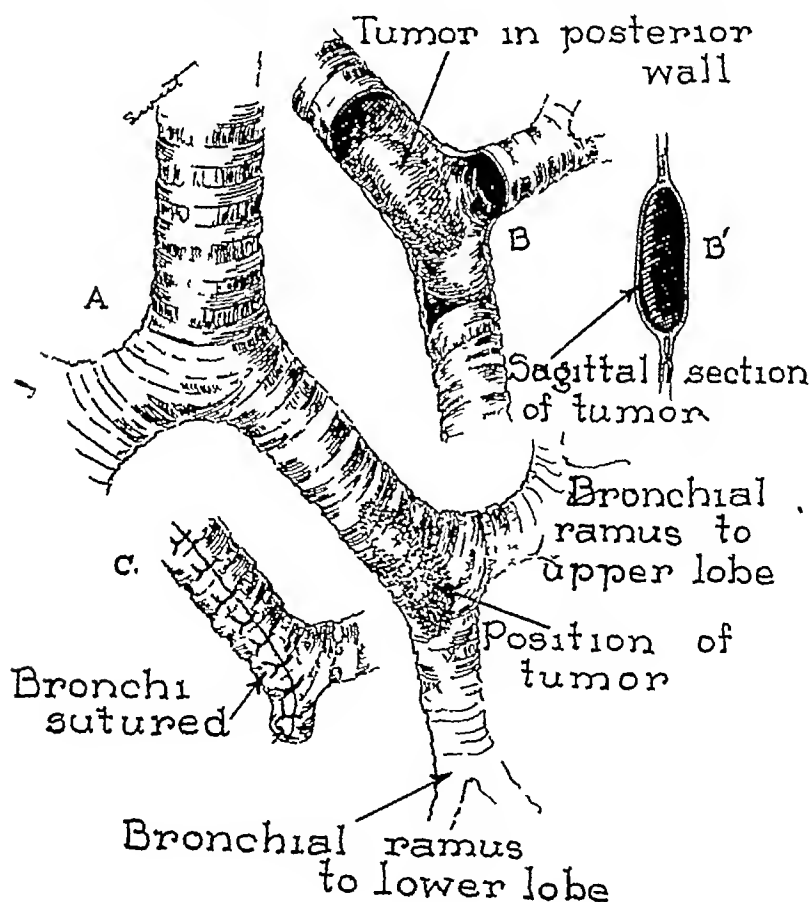


Figure 3 (Case 10)

colds" occurred and wheezing was marked. Hemoptysis increased in amount to 2 to 3 tablespoonsful of bright blood. In 1932, an x-ray film of the lungs was reported negative, although atelectasis of the left lower lobe was present. During the next three years, frequent "bad colds" with fever, and hemoptysis continued, but her general condition remained good enough for her to work as a telephone operator.

In 1935, an x-ray film (Case 10, Fig 2) of the chest was diagnosed pleurisy with effusion, and she was sent to a tuberculosis sanatorium for six months. The sputum was negative for tubercle bacilli. During the next four years hemorrhages continued, but none were severe. The pulmonary infections required hospitalization on two occasions during this period. Bronchography after bronchoscopic removal disclosed cystic bronchiectasis in the left lung (Fig 2) and no gross bronchial obstruction.

Bronchoscopy was performed on March 10, 1939. A lobulated, pink, vascular polypoid tumor completely obstructing the left stem bronchus was seen. Approximately one-half of the tumor was removed through the bronchoscope at this time, and the remainder of the endobronchial portion was removed two weeks later. The pathological diagnosis was bronchial adenoma. Some peripheral sections were composed chiefly of vascular spaces suggesting angioloma, but the deep sections showed the typical patterns of adenoma.

Since the bronchoscopic removal of the adenoma, she had carried on her job without losing time because of respiratory illness, in spite of destruction of the left lung by bronchiectasis. The sputum (1 or 2 ounces daily) continued, but the left bronchus was patent. Frequent bronchoscopic examinations failed to demonstrate residual tumor (Case 10, Fig 2) for seven years, but during 1945 she had two attacks of pneumonia and pinkish sputum recurred. Bronchoscopy in January 1946, showed a plaque



Figure 4



Figure 5

*Fig 4 (Case 10)* March 21, 1946, 13 days postoperative, showing expansion of the left upper lobe following left lower lobectomy and bronchotomy. Note that mediastinal displacement is approximately the same as April 26, 1939 (Fig 2) — *Fig 5 (Case 10)* Amputated left lower lobe showing cystic bronchiectasis and point of incision of the lobar bronchus. No tumor present.

of mucosa elevated approximately 2 millimeters and 2 centimeters long on the left stem bronchus just above the left stem bifurcation Its surface contained several spidery blood vessels

Pulmonary resection was performed on March 8, 1946, after mobilizing the left lower lobe, through a posterolateral incision under curare, oxygen and nitrous oxide anesthesia The extrabronchial residual tumor could be seen projecting into the posterior mediastinum from the posterior wall of the left stem bronchus (Fig 3, A,B) The entire lung was encased in dense adhesions It was decided to conserve the left upper lobe by doing a left lower lobectomy and a bronchotomy Accordingly, the left lower lobe pulmonary artery was ligated with heavy silk and divided The pulmonary veins were isolated and divided The lower lobe was amputated and the proximal lower lobe bronchus was held wide open



*Figure 6 (Case 10) Endomural tumor, bronchotomy specimen Note the cartilages with tumor above and below giving a dumb-bell shape to this residual tumor recurring 7 years after "complete" bronchoscopic removal*



*Figure 7*

*Figure 8*

*Fig 7 (Case 10) Microscopic section X500 showing typical bronchial adenoma pattern Several multinucleated cells are visible and the size and shape of the cells vary somewhat While these give the appearance of malignancy the tumor has run a benign course probably of 34 years duration—Fig 8 (Case 10) Another microscopic section from bronchotomy specimen X120, showing pressure necrosis of bronchial cartilage by locally infiltrating bronchial adenoma*



to visualize the endobronchial tumor in the left stem bronchus. The posterior bronchial wall was then incised in a "U" shape so as to include the entire residual tumor together with a full thickness of surrounding bronchial wall. The stem bronchus was then closed with a single layer of through and through interrupted No. 60 cotton sutures (Fig. 3-C). Two lymph masses in the hilum of the lower lobe and two nearby mediastinal lymph nodes were removed. Postoperative course was satisfactory and the patient was discharged on the fourteenth postoperative day. X-ray the day before discharge showed expanded left upper lobe (Fig. 4).

The surgical specimens consisted of the amputated left lower lobe (Fig. 5) and the endomural tumor (Fig. 6). The left lower lobe contained cystic bronchiectasis throughout and no tumor. The endomural tumor was approximately 2.5 centimeters long and 1 centimeter wide and was removed by open bronchotomy. Histological examination (Fig. 7) showed typical adenoma pattern and rather frequent multinucleated cells, as well as variation in size and shape. Necrosis of cartilage (Fig. 8) was also seen.

*Follow-up* This woman, now 38 years of age, is well, three months after left lower lobectomy and bronchotomy, seven years after bronchoscopic removal and 34 years after onset of symptoms.

### SUMMARY AND CONCLUSIONS

1 Although bronchial adenomata as reported in the literature may be a potentially or actually malignant tumor, our observations indicate that clinically it is benign if treated as a locally invasive, very slow growing, epithelial tumor.

2 Bronchoscopic removal is of value in preparing the patient for pulmonary resection but is not a definitive treatment because it fails to remove the entire tumor in at least 90 per cent of the cases.

3 Late recurrences (after 5 to 10 years) are to be expected following bronchoscopic removal. Failure to recognize and remove such recurrences may lead to progressive destruction of an entire lung.

4 After two or three attempts at bronchoscopic removal, if the patency of the bronchus is not re-established, or if severe hemorrhage occurs, this treatment should be abandoned in favor of pulmonary resection.

\*5 Ten cases of pulmonary resection are reported with a cure rate of 90 per cent and one surgical death from infection. This death, the first case operated upon, might have been prevented with the prophylactic use of sulfamerazine and penicillin.

6 A technique is described for conservation of the upper lobe applicable to adenomata located in a stem bronchus, and accomplished by combining lobectomy with bronchotomy.

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\*Since this was written two additional cases have been successfully operated upon by the author. In one a metastasis was present in a removed hilar lymph node.

7 Pulmonary resection accomplished a satisfactory result in nine cases and was superior to bronchoscopic removal in treatment of

- (a) bronchoscopically inaccessible and large tumors,
- (b) recurrent tumors following bronchoscopic removal,
- (c) distal pulmonary suppuration,
- (d) involved mediastinal lymph nodes

8 No metastases have occurred in any of these ten patients, although in three, tumor was left in the pulmonary stump without apparent spread

9 With modern pre- and postoperative care, intratracheal anesthesia, and surgical technique, pulmonary resection should be urged for the treatment of benign tumors of the lung, especially in view of their low morbidity, good prognosis and low operative mortality

### RESUMEN Y CONCLUSIONES

1 Aunque de acuerdo con la literatura el adenoma bronquial puede ser un tumor potencialmente o realmente maligno, nuestras observaciones indican que desde el punto de vista clínico es benigno si se le trata como un tumor epitelial, localmente invasivo, que crece muy despacio

2 La extirpación broncoscópica es de valor para preparar al paciente para la resección pulmonar, pero no es un tratamiento definitivo porque no se extirpa todo el tumor en por lo menos el 90 por ciento de los casos

3 Pueden esperarse recidivas tardías (después de 5 a 10 años) subsiguiente a la extirpación broncoscópica. La falta de reconocer y de extirpar esas recidivas puede conducir a la destrucción progresiva de un pulmón entero

4 Después de dos o tres tentativas de extirpación broncoscópica, si no se restablece la permeabilidad del bronquio, o si ocurre una hemorragia severa, debe abandonarse este tratamiento y hacerse la resección pulmonar

5 Se informa sobre diez casos de resección pulmonar con un coeficiente de curación de 90 por ciento y una muerte quirúrgica debida a infección. Esta muerte, que ocurrió en el primer caso operado, quizás podría haber sido evitada mediante el uso profiláctico de sulfamerazina y penicilina

6 Se describe una técnica para la preservación del lóbulo superior aplicable a adenomas situados en un bronquio principal, y que se practica combinando la lobectomía con broncotomía

7 La resección pulmonar obtuvo un resultado satisfactorio en nueve casos y fue superior a la extirpación broncoscópica en el tratamiento de

- (a) tumores inaccesibles al broncoscopio y tumores grandes,
- (b) recidivas subsiguientes a extirpaciones broncoscópicas,
- (c) supuración pulmonar más allá del tumor,
- (d) invasión de ganglios linfáticos mediastínicos

8 No han ocurrido metástasis en ninguno de estos diez pacientes, aunque en tres de ellos se dejó tumor en el muñón pulmonar sin que tuviera lugar extensión aparente

9 Con la atención preoperatoria y postoperatoria, la anestesia intratraqueal y la técnica quirúrgica modernas, debe urgirse la resección pulmonar en el tratamiento de los tumores benignos del pulmón, especialmente en vista de la baja morbilidad, buen pronóstico y baja mortalidad operatoria

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## Discussion

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The paper presented has shown that bronchial adenoma is a slow growing, rarely metastasizing, epithelial tumor usually located in a stem or lobar bronchus. Some writers state that this tumor is at least potentially malignant, but Dr Goldman's cases have not developed any metastases. Other authors have noted regional metastases and even distant spread to the liver in one case and to the spine in another.

However, on the basis of his own observation in more than thirty cases, Goldman finds that this tumor does behave differently from cancer, and on this difference has used a new treatment for surgical management of bronchial adenoma. The principle that surgical cure for cancer of the lung demands pneumonectomy rather than lobectomy is adhered to throughout the country. But Dr Goldman has shown in several cases reported here in his thorough follow-up of eleven cases treated by pulmonary resection, that five-year cure is readily obtained in patients treated with lobectomy. Because many adenomata are located in a stem bronchus without suppurative disease in all lobes on that side, he advocates conserving the non-suppurating lobes by combining bronchotomy with lobectomy. I believe this method of lobectomy combined with bronchotomy is an advance in the surgical treatment of bronchial adenoma.

The earlier we diagnose bronchial adenoma, the less suppurating and the more normal lung will accompany the tumor as a rule. In the future this tumor will probably be diagnosed earlier than in the past. Any treatment that conserves the normal lung and removes the tumor ought to be used, in spite of the fact that we might expect some recurrences ten or fifteen years hence. The open bronchotomy under direct vision leads to a more complete removal than can be accomplished through the bronchoscope, since endo- and extrabronchial portions cannot be removed by the latter method but are readily resected by the former treatment. It would seem that the described method is preferable to bronchoscopic removal, although endoscopic treatment may precede lobectomy plus bronchotomy as in the case reported.

# Histoplasmosis—The Pathologic and Clinical Findings\*

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There are now two cases of histoplasmosis recorded in Wisconsin. The first case was encountered in July 1945 and published in June 1946.<sup>1</sup> The second case was published in the same journal several issues later.<sup>2</sup> The condition is being recognized more frequently in many parts of the country. Histoplasmosis is caused by a yeast-like fungus, *Histoplasma capsulatum*, measuring about 5 microns in diameter, that is "phagocytosed" by the reticulo-endothelial system. This fungus may, therefore, be found in the liver, spleen, bone marrow, lymph nodes, lungs, skin and particularly in the adrenals. In some instances, all tissues of the body are involved.

There are four main clinical features that the disease may show. First, in children who comprise the highest number of cases, the gastrointestinal tract is most frequently involved. This consists of ulcerations of any part of the intestinal tract but particularly the oro-pharyngeal site and the terminal portion of the small bowel. The ulcerations produced in such cases have the clinical findings of abdominal discomfort, vomiting, diarrhea, anorexia and weight loss. In such instances, the stools may be positive for the presence of *Histoplasma capsulatum*. Second is the skin manifestation, as seen in adults or children, particularly in the area of the oronasal regions. These changes vary from papules to ulcers and true abscess formations. Third is the occasional occurrence of predominant cardiac or joint manifestations. Fourth is the visceral involvement including lymph nodes, spleen, liver and lungs. In the cases where the lung findings had been recorded, there is an incidence of 20 per cent that showed changes in the respiratory system. In this series, at least half had clinical evidences that may be confused with tuberculosis. These included pulmonary infiltrations, fever, night sweats, sometimes chills and at other times roentgenographic changes of pulmonary calcification, of pneumonitis and abscess formation. In several of these instances, the disease was associated with tuberculosis.

This disease was first noted by Strong<sup>3</sup> in 1906. He did not name

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the infection but likened it to leishmaniasis. In the same year, Darling reported his first case and subsequently reported the two others to make a total of three. It is Darling who gave the organism its name *Histoplasma capsulatum* and the disease, therefore, has been called histoplasmosis. More recently, Meleney<sup>4</sup> has suggested the term of *reticulo-endothelial cytomycosis*. The first case recorded in the United States was in 1926 by Riley and Watson<sup>5</sup> in Minneapolis. Subsequent to that time, there were some cases recorded on the continent. Then in 1938, cases were again being reported in the United States. There is now a collected number from the literature which amounts to about eighty. Some have been recorded twice and some independently by separate authors so it is difficult to determine accurately the correct number. The states neighboring Wisconsin all have reported cases: Illinois 4, Michigan 10, Minnesota 1, and Iowa 1.

The organism can be cultured and inoculated into laboratory animals. In culturing, it has two forms, a mycelial form which is grown on artificial media and a yeast-like budding form which grows in the presence of animal protein or in tissues. The diagnosis is made most commonly and satisfactorily in the histologic examination of a biopsied lymph node. Cultures should be made for absolute identification, however, in some instances, the organism has been recovered in the stool, bone marrow aspirations and peripheral blood. In a very few instances, blood cultures have been positive.

#### REPORTED CASE

Our case was that of a sixty-five year old white male who was born in Alsace-Lorraine but had resided for the past thirty-eight years in Milwaukee. He was a sign painter and a dog breeder. In 1938 and 1939 he visited abroad, travelling through England, France, Germany and Switzerland. During his last visit he was unable to return because of the war. While there, he had seen a physician for heart trouble. In the fall of 1944 when he returned to this country, he again had difficulty with his cardiovascular system. In the spring of 1945, anemia was noted and he received liver therapy. He was admitted to the Milwaukee County General Hospital in July 1945 with complaints of severe weakness, weight loss, anorexia, anemia and inability to walk.

Physical examination revealed a marked anemia with a red cell count of 860,000, white cell count of 1,450 and platelets of 37,000. Blood N P N was 66. The patient exhibited cervical, axillary and inguinal lymphadenopathy in addition to a hepatomegaly and splenomegaly. Both liver and spleen were tender. The patient expired within three days in spite of supportive therapy. Antemortem bone marrow examination was unsuccessful.

Postmortem findings were those essentially of any case of leukemia, that is enlargement of lymph nodes, enlargement of liver and spleen and hyperplastic bone marrow with a grayish cast. The lymph nodes were grayish, speckled with hemorrhages and quite soft. There were no

ulcerations in the skin and mucous membranes, with the exception of the terminal ileum where one small ulcer was identified. The lungs showed a 1.5 cm peripheral caseous nodule in the lower one-third of the right upper lobe.

Histologic examination, however, was not that of leukemia. There were demonstrable histoplasma bodies throughout all of the viscera with the exclusion of skin and prostate. The thyroid was not studied. The caseous nodule of the lung was composed of eosinophilic granular material surrounded by an area of pneumonitis in which both the alveoli and alveolar walls revealed the presence of huge phagocytic cells containing numerous histoplasma bodies. The heart showed demonstrable interstitial myocarditis with inflammatory granulomatous areas in which there were also macrophages with the ingested histoplasma bodies. Similar changes were very evident in the spleen, liver and bone marrow. Isolated histologic evidences were found in the gallbladder, kidneys, adrenals, gastrointestinal tract and testis.

The pathogenesis of human infection is not understood. In a case such as this, caseous or calcified pulmonary nodules may represent a focal area from which dissemination may take place to produce a picture such as described in this case. The occurrence of such dissemination produces the ordinary picture of a generalized systemic, progressive and fatal disease. This is associated with weakness, fever, weight loss, anemia and leukopenia. Spontaneous infection has been described in dogs<sup>6,7</sup> and Pinkerton<sup>8</sup> suggests that animal reservoirs may serve as a source of human infection through the medium of an insect vector.

Concerning pulmonary histoplasmosis, there is a very important finding reported by Palmer<sup>9</sup> and Furcolow<sup>10</sup> of pulmonary calcifications associated with negative tuberculin skin tests. The map diagram of Palmer showing the percentage of positive histoplasmin reactors among student nurses is startling. According to the map Tennessee, Kentucky, Arkansas, Missouri, Indiana, and parts of Ohio, Illinois, Kansas and Louisiana are the most heavily infected regions. In this area, the percentage is given as 68.3. Similarly, according to Palmer, the percentage of positive histoplasmin reactors among student nurses in specific states is also cited. The highest incidence is seen in Kansas City, Missouri, 58.1 per cent positive reactors, whereas in Minneapolis the percentage is only 4.8. This emphasizes the eastern central states of the country as those predominantly involved. Furcolow has also determined the percentage of histoplasmin positive reactors in Kansas City, Missouri where some 17,000 persons were tested. The first graph taken from his work shows the distribution of tuberculin positive and histoplasmin positive reactors in males and females. It is seen in both males and females that histoplasmin reactors reach a high percentage (70 per cent) between the ages of 5 and 20 years, whereas, the corresponding percentage in tuber-

culosis is reached at about the age of forty-five in both males and females. Likewise, his next graph shows the difference in tuberculin positive reactors by age, sex and race versus that of histoplasmin. It is seen that white and negro males and females have a higher incidence of histoplasmin reactors at the age of eighteen than of tuberculin reactors. It is about 65 per cent positive for histoplasmin and only about 30 per cent positive for tuberculin (the 30 per cent is that of the negro), the white at the same age has a figure of about 12 per cent positive tuberculin reactors. When this is interpreted in the light of percentages with pulmonary calcification, Furcolow shows that in individuals who are histoplasmin negative and tuberculin negative there is less than 5 per cent pulmonary calcification. In those who are histoplasmin negative and tuberculin positive, the percentage with pulmonary calcification is about 17. Those who have a positive histoplasmin and tuberculin skin test have an incidence with pulmonary calcification of less than 30 per cent. However, those with histoplasmin positive and tuberculin negative skin tests have the highest incidence of pulmonary calcification which is slightly greater than 30 per cent. If this is interpreted according to the figures of Palmer, it may be summarized as follows. In his work with nurses, those reacting only to tuberculin have pulmonary calcifications in 10 per cent of the cases, whereas, those reacting only to histoplasmin had a 30 per cent incidence of pulmonary calcification. This then shows that there is a discrepancy between the incidence of pulmonary calcification and positive tuberculin skin tests. It similarly shows that the highest incidence of pulmonary calcification is seen in the group of individuals who are histoplasmin positive. This is further brought out in reference to coccidioidomycosis according to work done by Aronson.<sup>11</sup> Aronson had demonstrated that pulmonary calcifications were frequently found in individuals who gave a positive coccidioidin reaction. This work was done with Indians in Arizona and it is his opinion that pulmonary calcifications do not follow the distribution of tuberculin positive skin reactors. It has been said that the individuals who are tuberculin negative and have pulmonary calcifications may represent a type of individual with anergy, however, this is not born out by the fact that some such individuals become positive after a period of time and some who are given an injection of BCG vaccine do develop a positive tuberculin reaction later on.

The individuals who show a positive histoplasmin skin test are, of course, not proven cases of histoplasmosis. It should better be interpreted as a reaction in an individual who has been exposed to the *Histoplasma capsulatum* or some immunologically similar organism. The importance, however, lies in the interpretation of



pulmonary calcifications, more and more of which are being interpreted as non-tuberculous in origin

### SUMMARY

Histoplasmosis is generally a fatal systemic disease caused by the yeast-like fungus named *Histoplasma capsulatum*. This organism may be found within the reticulo-endothelial system. The infection is probably transmitted from animals, notably dogs.

The four principal clinical features of the disease are 1) Gastro-intestinal manifestations of ulcerations and diarrhea 2) Skin findings of chronic ulcerations and abscess formations 3) Cardiac or joint manifestations 4) Lymphadenopathy, hepatomegaly and splenomegaly. Lung findings are recorded in about twenty per cent of the cases. The findings are not characteristic and are frequently confused with tuberculosis. This is particularly true of pulmonary calcifications. The work of Palmer and Furcolow indicates that there is a high incidence of pulmonary calcifications in people with negative tuberculin tests. A number of such individuals, however, have a positive reaction to the intracutaneous injection of histoplasmin. This work was carried on among student nurses. The highest incidence reported was that in Kansas City, Missouri, where 58.1 per cent were positive skin reactors. It was also shown that there was a difference in the distribution of the positive tuberculin skin reactors and the positive histoplasmin reactors. The majority of the histoplasmin reactors are demonstrable between the ages of five and twenty years of age, whereas, the tuberculin reactors are found in the third and fourth decades. Both white and negro individuals have a higher incidence of histoplasmin positive reactors at the age of eighteen than tuberculin positive. It is likewise shown that in those who are histoplasmin negative and tuberculin positive the incidence of pulmonary calcification is about 17 per cent, however, those with histoplasmin positive and tuberculin negative skin tests have the highest incidence of pulmonary calcifications which is slightly greater than 90 per cent. Somewhat similar studies were also carried out by Aronson in reference to coccidioidin positive reactors and pulmonary calcification. It must be pointed out, however, that the individuals who react positively to this skin test do not have proven or clinical histoplasmosis. The reaction may be due to some immunologically similar infection. It is probably important to consider that quiescent pulmonary calcifications, if they are due to *histoplasma capsulatum*, may serve as the focus for the usual fatal systemic infection.

The cases of histoplasmosis usually have a gross picture similar to that of leukemia. Caseous necrosis of the adrenals is particu-

larly common in these individuals. Histologically the organisms, averaging between 3 and 5 microns and surrounded by a capsule, may be seen throughout the reticulo-endothelial system contained in the phagocytic reticulum cells. From the laboratory standpoint a profound secondary anemia, leukopenia and thrombocytopenia are quite frequent.

There are two cases reported from the state of Wisconsin to date. Neighboring states also have cases: Illinois 4, Michigan 10, Minnesota 1, and Iowa 1.

### RESUMEN

La histoplasmosis suele ser una enfermedad orgánica fatal, causada por un hongo parecido a la levadura y llamado el *Histoplasma capsulatum*. Puede encontrarse este organismo dentro del sistema reticulo-endotelial. Probablemente algunos animales, especialmente el perro, transmiten la infección al hombre.

Los cuatro rasgos clínicos principales de la enfermedad son:

- 1) Manifestaciones gastro-intestinales de ulceraciones y diarrea.
- 2) Hallazgos cutáneos de ulceraciones crónicas y formación de abscesos.
- 3) Manifestaciones cardíacas o articulares.
- 4) Linfadenopatía, hepatomegalia y esplenomegalia.
- 5) Se han anotado hallazgos pulmonares en un veinte por ciento de los casos. Estos hallazgos no son característicos y con frecuencia se les confunde con la tuberculosis, especialmente en el caso de calcificaciones pulmonares.

Las investigaciones de Palmer y Furcolow indican que con gran frecuencia ocurren calcificaciones pulmonares en personas que han reaccionado negativamente a la tuberculina. Sin embargo, un cierto número de estos individuos reaccionan positivamente a la inyección intracutánea de histoplasmina. Esta investigación fue llevada a cabo entre estudiantes y enfermeras. Se observó la frecuencia más elevada en Kansas City, Missouri, donde el 58.1 por ciento fueron cutáneo-reactores positivos. También se demostró una diferencia entre la distribución de los cutáneo-reactores positivos a la tuberculina y los reactores positivos a la histoplasmina. La mayor parte de los reactores a la histoplasmina se encuentran en el período etario de cinco a veinte años, mientras que los reactores a la tuberculina se hallan en la tercera y cuarta décadas. Entre los individuos de dieciocho años de edad, tanto blancos como de raza negra, hay un mayor porcentaje de reactores positivos a la histoplasmina que a la tuberculina. Se demostró asimismo que en aquellos que son negativos a la histoplasmina y positivos a la tuberculina la frecuencia de calcificación pulmonar es del 17 por ciento, más o menos, empero, los que son positivos a las pruebas cutáneas con histoplasmina y negativos a la tuberculina presentan el más alto porcentaje de calcificaciones.

pulmonares, el que asciende a un poco más del 90 por ciento. Aronson también llevó a cabo estudios algo semejantes referentes a reactores positivos a la coccidioidina y calcificaciones pulmonares. Es necesario observar, sin embargo, que los individuos que reaccionan positivamente a la prueba cutánea con histoplasmina no tienen histoplasmosis clínica o comprobada. Es posible que la reacción se deba a una infección inmunológicamente semejante. Probablemente, es importante tener en cuenta que calcificaciones pulmonares quiescentes, si son causadas por el histoplasma capsulatum, pueden servir de foco de la infección general que es usualmente fatal.

Los casos de histoplasmosis generalmente presentan un cuadro macroscópico semejante al de la leucemia. En estos individuos es particularmente común la necrosis caseosa de las cápsulas suprarrenales. Histológicamente, los organismos, que miden de 3 a 5 micrones y que están rodeados de una cápsula, se encuentran dentro de los fagocitos del retículo a través del sistema reticulo-endotelial. Desde el punto de vista de laboratorio, es bastante frecuente una anemia secundaria profunda con leucopenia y trombocitopenia.

Hasta la fecha, se ha informado sobre dos casos en el Estado de Wisconsin. Los Estados vecinos también han tenido casos, a saber 4 en Illinois, 10 en Michigan, 1 en Minnesota y 1 en Iowa.

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# A Critical Study of Pneumoperitoneum and Phrenic Nerve Crush in Pulmonary Tuberculosis\*

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While pneumoperitoneum with or without phrenic nerve interruption has been used in the treatment of pulmonary tuberculosis for several years, most writers using this form of treatment have hesitated to present a statistical report of their results Banyai,<sup>1</sup> in 1938, reporting on the use of pneumoperitoneum without phrenic interruption in 120 cases of pulmonary tuberculosis states, "Because of the grave prognosis in most of my patients, no attempt is made to present a statistical analysis" Burge,<sup>2</sup> Hobby,<sup>3</sup> Trimble,<sup>4</sup> Rudman,<sup>5</sup> Stokes,<sup>6</sup> and others have stated their limited indications for this procedure, cited short case reports, but have not further reported their results There have been attempts by others as Rillance and Warring,<sup>7</sup> and recently Crow and Whelchel,<sup>8</sup> and Anderson and Winn<sup>9</sup> to analyze their results These latter investigators have been considerably more optimistic in their reports It is most interesting to note that certain sections of the country have used this form of treatment extensively, while in others it is used little or not at all Recently (January 1946, American Review Tuberculosis) the Committee on Therapy of the American Trudeau Society stated that a survey of institutions with an aggregate total of over 25,000 occupied beds showed that there were 1600 cases presently receiving pneumoperitoneum It must be granted that this form of therapy is having a wave of enthusiasm equal to no other treatment previously but artificial pneumothorax

Some of the earlier reports gave the indications for pneumoperitoneum alone or combined with phrenic paralysis as limited to bilateral extensive disease Where pneumothorax was unsuccessful and extensive surgery was not possible, such a procedure was considered as a preliminary measure Additional indications were those of advanced age, basal emphysema, combination with inadequate pneumothorax, previous phrenic procedure, and hemoptysis

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The two most recent reports have been enthusiastic and the authors make a plea for more extensive use of this procedure. They have extended their indications to the point where evaluation of their results becomes extremely difficult.

This presentation is based on a review of 103 cases of phrenic interruption and pneumoperitoneum with a critical attempt at evaluation and delineation of criteria for its use. All cases included in this series were those treated during the past 4 years with phrenic interruption and pneumoperitoneum. The extent of the lesion was classified by the National Tuberculosis Association standards, and as shown in Table I, there were 4 minimal, 47 moderately advanced, and 52 far advanced cases.

TABLE I — EXTENT

Minimal	Moderately Advanced		Far Advanced
4	47		52
<i>Location of Principal Lesion</i>			
UPPER	75	LOWER	12
MID	8	DIFFUSE	8

In this series there were 75 upper lung field lesions, 8 mid and 12 lower, 8 cases had diffusely spread processes. It is to be noted that of the 8 cases with cavities in the lower lung field, 1 closed, and of the 6 cases with cavities in the mid-lung field, 2 closed. These proportions are not significantly different from those found with closure of upper lobe cavities. In the series of 103 cases, 11 cases showed retraction of a lobe or a bronchopulmonary segment chiefly confined to the upper lung field. In 7 the cavity became smaller, in 2 there was no effect, in 1 there was no cavity present,

TABLE II — MAXIMUM RISE IN DIAPHRAGM

1 CM — 2	8 CM — 14
2 CM — 3	9 CM — 10
3 CM — 8	10 CM — 6
4 CM — 10	11 CM — 1
5 CM — 8	12 CM — 2
6 CM — 15	13 CM — 1
7 CM — 13	14 CM — 1
SMALL (?) — 7	
LARGE (?) — 2	

and in 1 the cavity became larger. Although a lobe or a segment became smaller in size, and tended to retract, it is significant that in no case was a cavity closed in the entire series by retraction.

As noted in Table II, 94 cases showed a definite rise of the diaphragm, measuring from 1 to 14 cm. Measurements were made from the tubercle of the 1st rib to the highest point of the diaphragm, on the x-rays showing maximum rise. In 9 cases the diaphragm could not be accurately visualized for measurement, and an attempt at some comparison was made by calling such cases "small" and "large" rise. Fifty-two cases showed a rise of 6 to 9 cm., and although there was no constant relationship found between degree of rise and effect, the cases with cavity closure averaged a 7 cm. rise.

Reference will be made later in the discussion as to the question of selection of cases for treatment. The inclusion of early exudative lesions with a high tendency to retrogression spontaneously will of necessity give a higher proportion of good results with treatment. Similarly the figures in any one reported group as to the percentage of good results will be dependent upon the types of cases selected for treatment. Since the group presented here represents essentially an older type of lesion, it was of some interest for us to analyze the time elapsed between date of diagnosis and admission. Although such a time interval does not properly represent the true age of the lesion, it gives some index in an overall comparison. In 43 cases only one year or less had elapsed between diagnosis and admission, while 60 cases had periods extending from 2 to 5 and more years. A comparison between cases showing closure of cavity, and those remaining patent, revealed that the group with a "good result" were considerably "earlier" cases as compared with those that did not respond.

### CAVITY CLOSURE

In order to critically evaluate the results of treatment, it is usually necessary to review as many x-ray films as possible taken prior to the institution of therapy to note the direction in which the lesion is going. This was possible to do in a fair proportion of cases where x-rays were available, or the patient had remained in the hospital a sufficient time before treatment was instituted. Table III reveals that there was closure of cavities in 9 cases, and shrinkage of cavities in 8 others prior to institution of therapy. Of the 9 cases whose cavities closed, 1 reopened after treatment was begun, and among the 8 cases which became smaller before treatment was instituted, 2 closed after treatment was begun. Of the 6 that remained, 2 showed no change, 2 became smaller, 1 larger, and 1 closed and reopened.

TABLE III — TENDENCY TO RETROGRESSION PRIOR TO INDUCTION OF PHRENIC AND PNEUMOPERITONEUM

(Observed either on pre-admission films or before treatment was begun)

	Before Treatment	After Treatment
Cavity Smaller	8	2 No Change, 1 Closed and Reopened 2 Closed, 1 Larger 2 Smaller
Cavity Closed	9	1 Reopened After Treatment was Started

The effects of phrenic interruption and pneumoperitoneum on cavity closure are shown in Table IV. There are 102 cases included in this series, since one case was eliminated because of the short duration of the treatment. In 38, no cavity was present, and in the remaining 64 cases, 30 showed no change. Only 7 cases with cavity actually closed, 2 of which had become definitely smaller prior to the induction of therapy. Eleven more became smaller, 2 of which had already begun to show signs of closing prior to induction of treatment. It is to be noted that the period of x-ray observation prior to institution of therapy was longer in the group with spontaneous closure.

TABLE IV — EFFECT OF PHRENIC AND PNEUMOPERITONEUM ON CAVITY

None Present	38 (8 had closed prior to induction)
No Effect	30
Smaller	11 (2 had already become smaller pre-induction)
Closed	7 (2 had already become smaller pre-induction)
Larger	12 (1 had closed pre-induction, reopened and ballooned out)
Closed and Reopened	3 (1 had already become smaller pre-induction)
Smaller and Larger	1 (had already become smaller pre-induction)
1 Cavity that showed no change not counted because of short duration of treatment	

## EFFECT ON INFILTRATION

As to the effects on the lesion itself by treatment, 29 cases with or without cavity showed definite clearing of the lesion. Thirteen of these began prior to treatment either associated with cavity changes or alone. Of these, 4 showed the same tendency bilaterally, before treatment, and cleared further simultaneously with treatment. Six with no previous observation period, showed clearing with pneumoperitoneum symmetrically on both sides. Nine showed clearing of a unilateral lesion, and 1 showed clearing of a bilateral lesion followed later by hematogenous spread and death.

Eight cases showed fibrosis, 1 of which showed a simultaneous fibrosis bilaterally, and 4 of the 8 started prior to treatment. In 1 of the 8 cases there was questionable fibrosis because of the appearance given by the retraction of the bronchopulmonary segment, and in another case, there was initial fibrosis followed later by spread of disease.

A review of the time factor between date of admission and phrenic interruption showed that in 23, the phrenic interruption was present or done on admission. In 46 additional cases, phrenic interruption was done up to 3 months, and 13 more up to 6 months. The remaining 21 cases were done from 6 months to more than 2 years after admission. As to the interval between phrenic interruption and induction of pneumoperitoneum, in 11 cases the pneumoperitoneum was begun first. As pointed out in other reports, there is a great advantage in such a procedure in that it provides a test for diaphragmatic adhesions and rise following phrenic crush. In 53 additional cases, the pneumoperitoneum was induced within a few days to a week after phrenic interruption.

Phrenic crush and pneumoperitoneum were used as a primary procedure in 51 cases. In the remaining 52 cases, pneumothorax had been previously unsuccessful. In 9 cases, therapy was discontinued because of inadequate rise of the diaphragm, and in 25 as clinically ineffective.

In Table V, it is noted that 23 patients were improved (conversion

TABLE V—EFFECT ON LABORATORY DATA

	Total	S t a g e		
		I	II	III
Improved	23	1	15	7
Unchanged	73	3	30	40
Worse	7		2	5
Total	103	4	47	52

TABLE VI—EFFECT ON CLINICAL CONDITION

	Total	S t a g e		
		I	II	III
Improved	47	4	23	20
Unchanged	37		18	19
Worse	19		6	13
Total	103	4	47	52



of sputum) in the 103 cases studied Table VI shows a larger number, 47, improved as to clinical condition, demonstrating again some of the palliative effects of treatment

The complications of artificial pneumoperitoneum have been listed by many authors In few instances, however, have the complications been of sufficient magnitude to cause discontinuation of therapy It is not always easy to decide exactly when the appearance of a new symptom or sign is actually a complication of the treatment or an associated condition There were 2 deaths during treatment, 1 from so-called shock and the other a tuberculous enteritis which developed while the patient was under treatment The appearance of extensive peritoneal exudate with symptoms has been heralded, by some, as the onset of a tuberculous peritonitis In 2 cases this sign together with fever was present, diagnosed as probable tuberculous peritonitis, and considered cause for discontinuation of therapy One patient developed gangrenous appendicitis with local peritonitis The case was operated on successfully, but it must be said that the diagnosis was difficult because of the associated pneumoperitoneum In 2 cases precordial pain appeared shortly after the onset of treatment In both cases treatment was stopped Other causes of discontinuation of therapy were dyspnea in 4 cases, 1 case of duodenal ulcer which became worse under treatment, abdominal pain in 3 cases, 1 with appendiceal signs, 1 case of femoral thrombosis, 2 of severe nausea and vomiting, and 3 of severe diarrhea With more careful selection of cases such a large proportion of complications might possibly have been reduced In one case mediastinal emphysema appeared, in another a spastic colon became worse and finally 2 cases showed a marked loss of appetite None of these symptoms, however, were severe enough to cause discontinuation of treatment

## DISCUSSION

An evaluation of any form of therapy in tuberculosis is extremely difficult The need for active treatment of the open cavity case has been especially stressed with Barnes and Barnes<sup>10</sup> figures of 90 per cent fatality in 5 years in such cases The ability of tuberculous lesions to retrogress with spontaneous closure of cavities has been similarly stressed and the finding in mass x-ray surveys of two-thirds of all cases of pulmonary tuberculosis in an arrested or cured condition is well known One of the most optimistic reports of cavity closure has been that of Fales and Baudet<sup>11</sup> who showed that 46.6 per cent of all cavities closed on bed rest while 66 per cent of "exudative" cavities closed in the same series

As to location of cavity for effect of treatment, there is no unanimity of opinion in the literature Of the 7 cavities which

closed with treatment, 2 were in the midlung field No case of cavity in the lower lobe closed with treatment alone

Absorption of exudative lesions and fibrosis is similarly difficult to evaluate In many instances absorption began before institution of therapy, and the lesions continued to retrogress after treatment was begun The most striking fact was the observation that bilateral lesions cleared simultaneously although the paralyzed hemidiaphragm was considerably more elevated and should theoretically have shown a more unilateral effect This observation would lead us to feel that the degree of rise of the diaphragm is not the most significant factor in the retrogression of such lesions

In the papers on the use of pneumoperitoneum and phrenic by Crow and Whelchel,<sup>8</sup> and Anderson and Winn,<sup>9</sup> the results were compared with those obtained with therapeutic pneumothorax In the papers by these authors, each group had approximately 85 per cent exudative disease and showed cavity closure in 63.3 per cent and 58.4 per cent respectively If one is willing to admit that the combined procedure is nothing more than an exaggerated or "better" phrenic, the problem of results and indications becomes simplified Recalling the figures of Fales and Baudet,<sup>11</sup> there is a striking resemblance between spontaneous regression and the results of this therapy

The apparent discrepancy between our results and those recently quoted has been observed repeatedly in other series with the use of phrenic interruption alone Bronfin<sup>12</sup> in his discussion of O'Brien's results with phrenicectomy pointed out that the latter's material was not comparable with that observed in other institutions whose patients are of the more advanced and chronic types Of O'Brien's 378 cases, 236 had thin walled cavities with 58.8 per cent closure Potter<sup>13</sup> et al, in a later study went so far as to say, "It can readily be seen how favorable results will multiply almost unbelievably when lesions either in the stage of spontaneous resolution or having the capacity to heal on a bed rest regime, are managed by some form of operation on the phrenic nerve" Our study leads us to a similar opinion as that of Potter with the use of the combination of pneumoperitoneum and phrenic interruption

It is important to differentiate between phrenic interruption with pneumoperitoneum and pneumoperitoneum alone The phrenic nerve operation carries with it a rather large possibility of permanent paralysis of the diaphragm Figures vary from 6 to 10 per cent and constitute a difficult problem in future surgical collapse Even where the diaphragm has apparently regained its usual motility on fluoroscopic examination, there is reason to believe that a partial atonicity is still present In addition, time for re-

covery not infrequently delays further surgical procedure. The results obtained in this study would not justify the wide spread use of phrenic interruption and pneumoperitoneum. The high proportion of permanent phrenic paralysis and the time factor involved in awaiting further surgery have been cited as deterrents to such a procedure. In addition, the institution of a more definitive collapse measure such as pneumothorax, thoracoplasty, or resection may be delayed in the frequently vain hope of promising results with phrenic and pneumoperitoneum alone.

The indications for phrenic interruption have not been definitely clarified after 35 years of use. The cases selected for treatment have been in many instances those that might very well have done as well on bed rest. For this reason results have varied depending on the type of cases included in the series, with a higher percentage of cures in the cases with early "exudative" cavitation.

While this paper does not deal properly with the use of pneumoperitoneum as a single procedure, certain impressions have been gathered in the last 6 months. The principal use for this treatment has been in cases of extensive bilateral disease. It is interesting to note the almost complete agreement of several authors in this limited indication.

Trimble<sup>4</sup> states, "It is also very important to be keenly aware of not only the physical, but psychological problems involved in the individual patient. At the other end of the clinical picture, there comes a point where no therapeutic measure at our command seems to be indicated. It would seem that pneumoperitoneum can be used in a patient who is more seriously ill with bilateral pulmonary tuberculosis than any other measure except the fundamental one of bed rest under proper sanatorium conditions."

Stokes,<sup>6</sup> in the conclusion to a paper entitled, "Pneumoperitoneum for Pulmonary Tuberculosis," says, "as a measure of pulmonary compression, pneumoperitoneum has very limited application in the treatment of pulmonary tuberculosis. However, where other measures either fail or cannot be utilized it may aid in the control of hemoptysis, and in reduction of toxemia. In this way an otherwise unsuitable case can sometimes be prepared for surgical intervention."

Banyai,<sup>1</sup> in 1938, stated, "I do not propose to consider pneumoperitoneum equal to any other accepted mechanical measure (it has its limitations and its advantages), but knowing that almost one-half of our sanatorium admissions arrive with a far advanced tuberculosis, it should be used as a matter of expediency in many instances rather than to leave the patient to his fate without any constructive treatment."

Mallick, et al,<sup>14</sup> reporting on a series of 176 cases treated in

India, showed that of 146 with positive sputum, only 15.6 per cent turned negative. A large percentage of the cases that remained positive were so improved, however, as to be able to resume some form of work. They state, "Pneumoperitoneum has a great palliative and in certain cases even a curative value. Its real merit lies in its particular applicability to advanced bilateral cases, which are by no means few in a country like India, where measures in the early detection and consequent management of the disease are yet in infancy, and for a fairly large number of which we have nothing more to offer than the fundamental principle of rest in bed."

Fowler<sup>15</sup> says, "Its true value appears to lie in the ability to improve the patient's general condition and alter the course of the pathological process, as demonstrated by x-ray in such a manner that a more direct approach by radical surgical measures become safe."

In a small series of cases of pneumoperitoneum treated at this Hospital without the use of phrenic interruption, the statements of the previous authors have been born out to a large extent. In patients with extensive bilateral disease, in whom bed rest produced little or no change, and where collapse therapy was impossible, pneumoperitoneum succeeded in improving their morale in a large measure. There was gain in weight, lessening of cough and expectoration, and occasionally slight changes noted on x-ray in the nature of improvement. As Trimble<sup>4</sup> has pointed out, such a mode of therapy has a very useful function in psychologic problems related to the tuberculous, particularly when the patient observes that despite deterioration of his condition or lack of progress no treatment other than bed rest is given him.

We have also used pneumoperitoneum in those cases of unilateral disease in which a spread has occurred to the lower lung field, and there is some necessity for waiting prior to the institution of surgical collapse therapy for the cavity in the upper lobe. Here the institution of phrenic nerve interruption would delay the operation unnecessarily until function of the diaphragm had been restored. There is some rise of the diaphragm with pneumoperitoneum alone of at least one interspace where adhesions are not present. Such a rise, and the concomittant limitation of motion of the diaphragm, further aids in the clearing of the process in the lower lung field.

It is our feeling then, that pneumoperitoneum alone has some value because of the positive psychological effect which it has in some cases of bilateral extensive tuberculosis, and also as a preparation of patients for surgery. The small number of complications which occur with pneumoperitoneum is not sufficient

to deter the clinician in using this procedure should he feel that it will be of any benefit at all. Should adhesions prevent the rise of the diaphragm for any reason it can be discontinued immediately.

One more use for pneumoperitoneum is in combination with pneumothorax. In certain instances of gross adhesions at the upper portion of the chest wall, relaxation of the diaphragm will assist in closure of the cavity. Here the pneumoperitoneum can be used as a preliminary measure to phrenic to test the rise of the diaphragm, and its effect upon the cavity. The value of this preliminary procedure would be to decide whether or not the phrenic will be of value.

### CONCLUSIONS

1 A study of 103 cases of phrenic nerve crush and pneumoperitoneum has been presented.

2 It has been shown that cavities in 9 cases closed prior to institution of treatment, while only 7 additional cases showed closure of cavities with treatment.

3 Where clearing of infiltration occurred following treatment, such clearing occurred simultaneously in bilateral cases and did not appear to be influenced to a greater extent on the side of the paralyzed hemidiaphragm.

4 The limited indications of pneumoperitoneum without phrenic interruption are presented and its value as a psychologic measure in the treatment of tuberculosis is emphasized.

### CONCLUSIONES

1 Se ha presentado un estudio de 103 casos de trituración del frénico y neumoperitoneo.

2 Se ha demostrado que en 9 casos se cerraron cavernas antes de comenzar el tratamiento, mientras que sólo en 7 casos adicionales se cerraron cavernas con el tratamiento.

3 En los casos en que se aclaró la infiltración después del tratamiento, tal aclaramiento ocurrió simultáneamente en casos bilaterales y no pareció haber sido influenciado más en el lado del hemidiafragma paralizado.

4 Se presentan las limitadas indicaciones del neumoperitoneo sin la interrupción del frénico y se hace hincapié sobre su valor como medida psicológica en el tratamiento de la tuberculosis.

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## DISCUSSION

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The very fact that pneumoperitoneum is having a wave of popularity and enthusiasm today demands that critical studies of the indications for and the results of this form of therapy be undertaken by pthysiologists again and again, until its true worth is established Dr Hurst and his co-workers have, by their discussion, made a valuable contribution to the overall estimate A careful breakdown of their series of cases indicates to us that pneumoperitoneum is of questionable, or at best, of very limited benefit in the treatment of the lesions of pulmonary tuberculosis This has also been our experience

It is imperative that something aggressive be undertaken in those unfortunate cases where no form of therapy other than bed rest seems, at the moment, indicated The morale of the individual concerns us greatly and every possible effort must be made to bolster that morale A tendency toward normalization of the psychiatric balance of the patient occurs with every new hope offered him Change of residence, change of physician, re-

action to mild exercise such as bathroom privileges, and the use of intravenous therapy, such as calcium, which we generally recognize to be without material benefit, are examples of these new hopes. So in advanced bilateral cases of tuberculosis suited to no therapy other than bed rest, why should pneumoperitoneum not be employed at times if only for its psychological benefit? Certainly in institutions where the patient pays an overall fee coverage or where treatment is rendered without charge, there should be no objection. However, it seems to us that less aggressive measures should be offered to patients not in the above categories for the betterment of their psychiatric status alone.

One further indication for pneumoperitoneum not referred to by Dr Hurst seems worthy of mention. In some women, pregnant and afflicted with pulmonary tuberculosis, we have seen dramatic improvement in general physical condition and also definite regression of the pulmonary lesions. In some of these cases we have been particularly pleased with the postpartum progress where pneumoperitoneum has been employed as a substitute for the intra-abdominal pressure occasioned by the pregnant uterus.

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## DISCUSSION

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Dr Hurst and his associates are to be congratulated on presenting before the medical profession again, the value of instituting artificial pneumoperitoneum in the treatment of pulmonary tuberculosis.

Early in 1932 at Oak Forest, we had accidentally produced artificial pneumoperitoneum in a patient who had a phrenic nerve interruption and was getting artificial pneumothorax. The diaphragm was pierced accidentally and air was introduced into the peritoneal cavity instead of the pleural cavity. We were happily surprised to find that the diaphragm had a pneumatic pad underneath which had pushed the diaphragmatic leaf higher than before the artificial pneumoperitoneum was established.

In 1936, Dr Joannides and myself reported in the *Journal of Thoracic Surgery*, the value of artificial pneumoperitoneum in collapse therapy of pulmonary tuberculosis as an adjunct to phrenic nerve interruption. In the Tuberculosis Hospital at Oak Forest, we use this form of collapse therapy primarily in patients in whom phrenic nerve interruption is not effective because of limited tonus of diaphragm.

In order to explain our indications of artificial pneumoperitoneum it may be advisable to discuss the mechanics of diaphragmatic paralysis. At each inspiration, air is introduced through the tracheo-bronchial tree into the lung by virtue of a downward contraction of the diaphragm and an upward pull of the ribs through the action of the intercostal muscle, thus a higher negative pressure is produced in the pleural cavity which causes air to be sucked into the lung. The lung, because of the large amount of its elastic tissue, has a natural tendency to contract, therefore, as the contraction of the diaphragm is eliminated by phrenic nerve paralysis about one-third inspiratory capacity is eliminated. The lung expansion, therefore, is limited in proportion to diminished negative pressure in the pleural cavity. By introducing air into the peritoneal cavity and making the patient remain in a semi-sitting position or making the patient wear a belt to produce contraction of the abdominal muscles, the air in the peritoneal cavity has a tendency to find its way underneath the paralyzed diaphragm. By exerting additional intraabdominal pressure through contraction of the abdominal muscles or in the act of coughing, there is a mechanical pressure exerted on the paralyzed diaphragm pushing it up higher than its normal relaxed level. This mechanism enhances further contraction on the elastic tissue of the lung and thus the paralyzed diaphragm is pulled up to a higher level where it is likely to stay because of its inability to contract. In this way we have seen diaphragmatic leaves which under ordinary conditions were pulled up one or two interspaces, to rise as high as the 4th, 3rd or even the 2nd interspace by the use of artificial pneumoperitoneum. When this rise is once established it is no longer necessary to continue artificial pneumoperitoneum and the activity of the lung is further reduced by the diminution of space in the pleural cavity due to the mechanical rise of the diaphragm into the thorax. In this way, the lung is given the opportunity to remain at its minimum expansible capacity, encouraging healing of the tuberculous process.

This therapy, though valuable, is not without danger. In a patient with abdominal adhesions it is quite easy to puncture the abdominal viscera and introduce serious damage to the gastrointestinal organs. In one case, we had encountered even a typical picture of air embolism which cleared up under proper treatment. In this case the point of injection was rather high and undoubtedly the lung and the diaphragm were punctured at the costophrenic angle thus introducing the air into the pulmonary circulation and causing syndrome of air embolism.

In our routine we maintain artificial pneumoperitoneum long enough to produce a satisfactory rise of the diaphragm and then



discontinue artificial pneumoperitoneum Our results prove our concept of the mechanism of artificial pneumoperitoneum because we have seen the diaphragm stay up permanently In one case the diaphragm remained in this position as long as 10 years after discontinuing pneumoperitoneum

It is necessary that enough of the air be injected into the peritoneal cavity, as much as a maximum of 3000 cc of air may be necessary, so that the pneumatic pad will find its way under the paralyzed diaphragm The contracting diaphragm on the non-paralyzed side has a tendency to push the air under the paralyzed diaphragm on inspiratory contraction If too much air is introduced so that the pressure is exerted on non-paralyzed diaphragm the patient complains bitterly of pain in the shoulder and inspiratory pain giving all the symptoms referable to a typical Hedblom's Syndrome on patients in whom the diaphragm has not been paralyzed

I wish again to congratulate Dr Hurst and his associates for the excellent presentation of this important subject

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## DISCUSSION

HAROLD GUYON TRIMBLE, M D, F C C P

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Pneumoperitoneum, in our hands, is definitely helpful in the healing of patients with certain types of pulmonary tuberculosis I should not like to have to look after these patients with pulmonary tuberculosis and not be able to use this procedure

I wish that pneumoperitoneum was a better procedure I wish that it would do more to more patients with pulmonary tuberculosis and do it more quickly But, after all, penicillin has its limitations Sulfa drugs are excellent in controlling certain types of infection, and for others they have no value We wish that insulin would be more effective in the control of diabetes, but still it certainly has a definite place in management of the average diabetic

Knowing the types of patients Dr Hurst has in his institution, I want to point out that practically all of these patients have had attempts at taking the cure elsewhere Having failed they then seek admission to the National Jewish Hospital, so this material is immediately selected and is necessarily difficult to do anything with, with any procedure I take it that most of these patients have had adequate care before

With regard to the use of any type of phrenic interruption

with pneumoperitoneum, when we started using pneumoperitoneum some ten years ago, it was our practice to routinely do some type of phrenic operation on the most involved side. As time went by, we began to do less of this and finally, after we came to realize that temporary phrenic interruption is not always what it seems, and not only may, but frequently does, result in a permanent paralysis of the diaphragm, we began to use it much less frequently. About this time studies on measuring the vital capacity and oxygen exchange of each lung separately coming from Oslo, Norway, and particularly in this country by Pinner and associates from Montefiore Hospital in New York, confirmed our previous clinical impression that phrenic paralysis was not an innocuous procedure. For some years, then, we have used phrenics but rarely and only for specific indications. The net result of this is that we currently do very few.

With regard to the psychological effect of pneumoperitoneum, of course, any treatment that is successful builds up in the patient a favorable psychology. As a matter of fact, some treatments that are not successful can do the same thing temporarily, but this, of course, can not last and is bound to catch up with both the doctor and the patient eventually. It is difficult for me to understand how psychology alone can give us the marked changes we see in the x-ray films when pneumoperitoneum is used. For the 15 years previous to the time this procedure was used by us, we had the same type of patients at complete bed rest alone, and while such favorable pathological changes would occasionally occur, the x-ray pictures in similar cases, with pneumoperitoneum as we have been using it, is certainly very different. We have made an analysis of our cases up to and including 1942, and at the present time are engaged in a careful study of our cases for the last ten years.

While we started using pneumoperitoneum as a procedure only where other types of collapse therapy could not be initiated or else had failed, with observation of more cases over a longer period of time, we have broadened our indications so that we have come to use it in many instances as a primary procedure. It is particularly applicable and especially effective with bilateral infiltrations without cavitation. We consider it almost specific for these types of lesions. This does not mean that its use should be restricted to those alone. Increasing use of the procedure has confirmed our early impressions that pneumoperitoneum had a definite and rather substantial place in the collapse therapy of pulmonary tuberculosis.

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# Patent Ductus Arteriosus, Present Surgical Status\*

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After eight years of surgical treatment of patent ductus arteriosus the stage has been reached when a general survey of the progress made would seem warranted

As early as 1907, Munro<sup>1</sup> suggested the surgical ligation of a patent ductus arteriosus, and at necropsy demonstrated a possible operative approach. However no attempt to ligate a ductus in a living patient was reported in the literature until May 1938, when Graybiel, Strieder, and Boyer<sup>2</sup> reported an attempt to obliterate a patent ductus in a patient with subacute bacterial endarteritis. Because recovery from this complication was extremely rare, they felt justified in taking this pioneer step, and although the patient died on the fourth postoperative day of acute dilatation of the stomach, the operation was definitely a step forward. According to Gross<sup>14</sup> an earlier unsuccessful attempt to ligate a ductus had been made by O'Shaughnessy. The first successful ligation was performed by Gross and Hubbard<sup>6</sup> in August 1938. Dolley<sup>40</sup> stated that this success aided Dr. Jones and Dr. Bullock in obtaining parental consent for duct ligation in one of their patients, which operation was also successful. Then other parents, previously held back by untried surgical theory, readily consented to proved surgical fact. Since that time over three hundred cases of surgical closure have been reported in the literature.

Before weighing the results of surgical treatment of a patent ductus arteriosus, it is well to recall briefly the prognosis in such cases not treated by operation. In a review of the literature, Shapiro and Keys<sup>29</sup> analyzed all the cases of patent ductus arteriosus in adults from which postmortem examinations have been reported. They stated that 80 per cent of such patients eventually succumb to their cardiac lesion. These patients who were alive at seventeen years of age averaged thirty-five years of age at death. At least 40 per cent of these patients died of subacute bacterial endarteritis, and most of the remainder died of congestive cardiac failure. Spontaneous rupture of the pulmonary artery or the ductus occurred in a few cases. The average age of the fifty-one patients of their own series was twenty-five years,

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and the oldest patient died at fifty-eight Bullock, Jones, and Dolley<sup>11</sup> reporting on eighty cases of patent ductus in patients over the age of three years proved by necropsy to have no other significant cardiac anomaly, presented somewhat similar statistics Of this group 86 per cent died as the result of the congenital lesion Fifty-three per cent died of bacterial endarteritis, twenty-three per cent died of congestive failure

Since in the above mentioned series of untreated cases as much as 40 per cent or more died of bacterial endarteritis it is of special interest to study the progress made by surgical closure of the ductus in such cases The first surgical cure of subacute bacterial endarteritis involving a patent ductus arteriosus was reported by Touroff and Vessel<sup>16</sup> in 1940 In this and in subsequent reports,<sup>12 22 23 25</sup> Touroff and his associates have contributed considerable information regarding such cases Touroff states that in the early stages of infection, vegetations are likely to remain confined to the ductus and pulmonary artery, but in the latter stages of infection, or even in the early stages of severe infection, vegetations may spread to the cardiac valves or into the aorta Continued presence of the infection increases edema and makes the ductus and the adjacent structures more friable Because of these facts, the safety and effectiveness of the operation is greatly increased if surgical closure is effected as early as possible after infection is discovered Shapiro and Keys<sup>29</sup> reporting on 140 patients operated upon by a total of twenty-five surgical teams, stated that subacute bacterial endarteritis was present in thirty-three cases Of these thirty-three, twenty operations resulted in apparent successful cure Five patients died on the operating table as the result of hemorrhage, and in eight instances the fever persisted in spite of the ligation of the duct In one of the cases<sup>30</sup> in our series the streptococcus viridans disappeared from the blood stream almost immediately following ligation of the ductus and the patient entirely recovered To date, more than four years after operation, there has been no return of infection Blalock<sup>36</sup> reported on six operations on patients with streptococcus viridans Four were successful and two died subsequent to discharge from the hospital Of these two, the lumen of the ductus became reestablished in one Ziegler<sup>38</sup> reported the successful surgical cure of an unusual subacute bacterial endarteritis by ligation in a patient with patent ductus arteriosus complicated by the presence of a patent interventricular septal defect and an anomalous left vena cava Twenty-six (63 per cent) of these forty-one operations on cases associated with bacterial infection were successful As is generally known, the mortality rate of untreated cases of subacute bacterial endarteritis is approximately 100 per

cent Although in some cases of infection encouraging results have been obtained recently by large doses of penicillin,<sup>39</sup> chemical therapy alone has not proved effective in cases where the bacterial infection is superimposed on a patent ductus It is still too early to make a positive statement regarding the permanency of the cure effected by surgical closure of the ductus in such cases, but the results so far are definitely encouraging and, in the face of almost certain death without operation, it would seem that surgical closure should be strongly urged when it is known the infection is present It is believed that improved operative technique gained through experience has already decreased the likelihood of operative failure in these cases Johnson et al<sup>20</sup> suggests an operative technique where the thin-walled ductus creates a hazard of injury to ductus wall, in cases with subacute bacterial endarteritis with implantation in the ductus A suggested management of a torn ductus arteriosus is also given It can not yet be stated that ligation of the ductus in non-infected cases will entirely remove the danger of subacute bacterial endarteritis as in two cases infection developed postoperatively However, it is believed that ligation reduces the probability of this development As observed by Touroff,<sup>23</sup> the lungs play an important role in removing infective material from the circulating blood of humans and in cases of subacute bacterial endarteritis superimposed on patent ductus arteriosus, infective material enters the peripheral circulation at least in part, through the pulmonary circuit

The question of suture materials has not yet been definitely established in the minds of surgeons as a whole, nor has the manner of ligation been entirely standardized, although the correct choice of material and method is very important to the success of the operation Several types of ligatures have been used including linen, cotton, braided silk, and cellophane Cellophane, alone, has not been favored as it might bring about partial stenosis of the pulmonary artery or the aorta Wire, very popular in many operations, has not been used because of lack of resiliency, and the constant pulsating of the aorta might result in cutting through the ductus The umbilical tape ligature of women silk 5/32 inch in breadth, advocated by Mont Reid,<sup>4</sup> is probably the most frequently used Several methods of closing the ductus have been used The method of simple ligation with one ligature is not satisfactory as it leaves one end or the other of the duct open, allowing eddying which might not eliminate the roaring murmur, and would invite subacute streptococcus endocarditis Also, the ligature may cut through the wall and allow the lumen to become patent again Humphreys<sup>24</sup> reported a case where ligation was made with a single heavy silk ligature and the patency became

reestablished, necessitating a second operation. A double ligature of umbilical tape was used at reoperation. Gross<sup>7, 8</sup> originally used simple ligation, but later supplemented the use of woven silk ligature with the use of a ligature of cellophane, weight 300, of the unsurfaced type, placed over the silk ligatures. Another method used was that of a sclerosing fluid injected into a short segment of the ductus isolated by two ligatures. More recently Gross<sup>31</sup> has reported a series of 87 cases in which complete surgical division and closure of the patent ductus arteriosus was successfully achieved. He believes this technique is more desirable where conditions indicate that complete division of the vessel can be accomplished. Touroff<sup>22</sup> has stated that he found ductal ligation to be similarly effective to ductal division. We feel that cutting of the ductus is objectionable in that it adds somewhat to the gravity of operation with little, if any, benefit over ligation. Blalock<sup>36</sup> has recommended placing one purse string suture flush with the pulmonary artery and one with the aorta, not tied too tightly for fear of cutting through the friable ductus, then two through-and-through mattress sutures of silk are placed and tied between the two purse string sutures. A ligature of umbilical tape is then tied over the mattress sutures of silk. This seems to be one of the most logical methods advocated, provided the ductus is not too short. He suggests that even if division and closure of ductus is the method used, the preliminary placing of purse string sutures at the extreme ends of the ductus would make the procedure less dangerous. In our experience, which is limited to eleven cases, we have used one of the methods first adopted. Two ligatures of braided silk are made, one flush with the aorta and one flush with the pulmonary artery. So far, there have been no bad effects and no reestablishment of the lumen of the ductus has been noted. This procedure is particularly applicable when the ductus is short and dissection and isolation is more difficult.

It is not felt that surgical closure of the patent ductus arteriosus should be indiscriminately advised in all cases, however the hazards of a patent ductus are sufficiently serious and the per cent of successful operations in experienced hands has increased enough that operation is advisable in probably the majority of cases. Gebauer and Nichol<sup>17</sup> have expressed the belief that operation should be performed early because children withstand thoracic surgical procedures so much better than adults, because the operation is technically easier, and because the shorter the duration of patency, the less the degree of pulmonary dilatation, cardiac enlargement, vessel sclerosis, and the less severe the postoperative reaction.

It has long been recognized surgical closure of a patent ductus

would terminate fatally in cases where another abnormality of the heart is present which requires the open ductus as a compensatory mechanism. These cases are usually easily recognizable with careful examination. The function of the patent ductus in such cases was demonstrated recently by the interesting work of Blalock in case of partial stenosis of pulmonary artery in which he creates what might be called an artificial patent ductus arteriosus by anastomosing the innominate or subclavian artery to the pulmonary artery to divert the blood of the aorta to pulmonary artery, which is what occurs when ductus arteriosus remains patent. In this connection it would be interesting to note whether his cases will in time develop bacterial endarteritis. It would seem that large doses of penicillin should be administered immediately.

Ziegler<sup>38</sup> observes that it is generally agreed that the absence of typical murmurs constitutes a contraindication to surgical intervention in cases of suspected patent ductus arteriosus, but since typical murmurs are absent in nearly a third of the cases and the incidence of subacute bacterial endarteritis ranges as high as 50 per cent, a decision in favor of surgery may be advised in such cases if the infectious agent is resistant to sulfonamides or penicillin, and of course, provided no other congenital defect is present which requires the patent ductus as a compensatory mechanism.

In our series of eleven cases, there were ten successful surgical ligations and one death from an associated interventricular defect. Of the ten successful operations, there were eight uncomplicated cases, one with streptococcus viridans infection, and one with an aneurysm of the pulmonary artery. It is interesting to note that although patent ductus arteriosus is not essentially a common vascular defect, two of the children of our series were first cousins with the same surname and approximately the same age.

At the end of five years we find general improvement in our patient's conditions. They are better developed and well nourished. One girl who had not menstruated, though beyond the normal age, has now started her regular periods.

### COMMENT

Judging from our own experience and from a review of the cases reported in the literature, surgical closure of patent ductus arteriosus can be accepted as a successful means of treatment in a large number of cases. In view of the gratifying results in cases of bacterial endarteritis associated with patent ductus arteriosus, it is felt that surgical closure as soon as possible should be urged in such instances.

## COMENTARIO

A juzgar por nuestra propia experiencia y por un repaso de los casos informados en la literatura, el cierre quirúrgico del *ductus arteriosus* abierto puede ser aceptado como un tratamiento satisfactorio en un gran número de casos. En vista de los resultados placenteros obtenidos en casos de endarteritis bacteriana asociada con *ductus arteriosus* abierto, se opina que en estos casos se debe urgir el cierre quirúrgico tan pronto como lo sea posible.

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## DISCUSSION

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The subject has been admirably covered by Dr Nixon Eight years of experience and study of patent ductus arteriosus has brought about unanimity of opinion on most of the problems that first confronted the surgeon Two important problems are not yet completely settled, the indication for surgery and the type of surgical treatment It appears that in infants and children operation gives the best chance for longevity and therefore is always indicated since the surgical mortality and morbidity are so low However, when the condition is accidentally discovered in an adult, perhaps it is best to withhold surgery unless definite symptoms are present In treatment it seems that the trend is toward division of the ductus rather than ligation However, one must concede that when either method is adequately accomplished, the results appear to be equally good

I would like to complicate the diagnostic problem by presenting a case of a young colored adult, male, diagnosed as patent ductus arteriosus At operation all the findings of a patent ductus arteriosus were present except the ductus itself The aorta was normal, the pulmonary artery dilated and it presented the typical thrill Demonstration of the ligamentum arteriosum was necessary to rule out the presence of a patent ductus Approximately one year later at autopsy a communication between the aorta and pulmonary artery was demonstrated just distal to competent aortic and pulmonic valves When there is aorto-pulmonic communication caused by rupture of a syphilitic aneurysm or from rupture of a congenital aortic septal defect, there is a sudden onset of acute symptoms and therefore, it cannot be confused with patent ductus arteriosus If there is a congenital aorto-pulmonic communication without other cardiac or vascular anomalies as in the patient described, the symptoms and findings will be indistinguishable from the symptoms and findings of patent ductus arteriosus The patient described had a positive Wassermann reaction and microscopically a syphilitic aortitis, apparently superimposed upon a congenital anomaly The communication grossly seemed congenital and there was no history of sudden acute onset of symptoms suggesting a perforation of an aneurysm, either syphilitic or congenital

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# Hazards of Bovine Tuberculosis as a Matter of Public Health Significance and Potential Human Lung Infections with Bovine Tubercle Bacilli

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Following discovery of the tubercle bacilli by Professor Koch, three types of the organisms were soon recognized immunologically as separate and distinct entities, i.e., the human, bovine and avian. For several years thereafter, Koch, as well as many other reputable scientists in the field of bacteriology, contended that the host-species in each category would not contract tuberculosis when exposed to other types of the bacilli and, therefore, bovine tuberculosis was not transmissible to man. However, that conclusion was later exploded and Koch, after much reluctance, finally changed his former opinion in the premise. Consequently, the transmission of tuberculosis from animal to man soon became a generally accepted fact but not without reservations as to its clinical effects. A consensus prevailed that, although transmissible to man, the condition produced by the bovine tubercle bacilli was confined mainly to certain circumscribed limitations such as glandular or lymph node infections and tuberculosis of the bone and joints, but it was not considered to be more than passively capable of producing pulmonary lesions of tuberculosis. With the development of better methods and more practical means of typing, greater stress in recent years has been attached to the importance and desirability of identifying the type of bacilli actually responsible for the disease when it occurs in man. Today bovine bacilli stand convicted not only as the causative agent of a variety of clinical forms, including progressive tuberculosis in man, but pulmonary tuberculosis of bovine origin has been established either clinically or on necropsy in an increasing number of human cases, particularly in European countries where bovine tuberculosis flourishes to a much greater extent among cattle at the present time. Also an increasing number of generalized cases of tuberculosis in humans attributed to the bovine bacilli have been reported in several of these countries.

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\*Inspector in Charge, U. S. Bureau of Animal Industry, Sacramento, California. Presented at the 12th Annual Meeting of the American College of Chest Physicians, San Francisco, California, June 28, 1946.

Jordan, states "that no less than 30 per cent of the cattle in England are affected with tuberculosis In England 52 per cent of all deaths in man due to tuberculosis are the result of the bovine tubercle bacilli and 25 per cent of the deaths from non-pulmonary tuberculosis are due to the bovine tubercle Milk samples from various cities show virulent tubercle bacilli in from 29 to 111 per cent "

Lobesian, Jansen and Lossen, reported recovering bovine tubercle bacilli from 26 cases of pulmonary tuberculosis in man in Copenhagen, Denmark

W T Monroe and H Scott, writing on the subject of human and bovine type meningeal tuberculosis in Scotland, reported "50 cases, 14 at the Glenomen Sanitarium, 7 of which were human and 7 were bovine, while in 36 cases at the Royal Infirmary Dundee, 25 were human and 11 were bovine " Continuing, the authors state "it is noteworthy to mention that 55 per cent of the bovine cases were in infants and children under five years of age "

A Stanley Griffith presents the following "The British Royal Commission on Tuberculosis in 1907 found that cow's milk containing bovine tubercle bacilli is clearly a cause of tuberculosis and fatal tuberculosis in man Our results clearly point to the necessity of means, more stringent than those at present enforced, being taken to prevent the sale and consumption of such milk Twenty-five years have passed and the country still has a milk supply infected with tubercle bacilli to such an extent that often from 5 to 12 per cent and more of samples of ordinary churned milk contained tubercle bacilli and more than one-third of the cows in this country are tuberculous " He further states, and quotes figures in reporting on milk in London, south of England and northeast Scotland as follows "It is impossible to compute how many people have died from infection with the bovine tubercle bacillus since 1911, or what it has cost or is costing in providing institutional treatment for crippled and in other ways incapacitated human beings When to all of this are added the economic losses from bovine tuberculosis among animals, the tribute paid to the bovine bacillus must be enormous Since 1911 a number of type demonstrations have been made and the proportional frequency of human and bovine types of bacilli in the different varieties of tuberculosis have been determined and show that all varieties of the disease may be caused by the bovine bacillus

"In spite of all the evidence," he continues, "which has been accumulated from 1911 onwards on the danger of tubercle bacilli infected milk, the chief administrative measures in this country for the control and prevention of bovine tuberculosis in animals and man are the slaughter of cattle only when they have done

untold mischief, and by clinical veterinary inspections, not by any means general, which may eliminate the dangerous animals a little sooner than other would be the case but will never lead to the eradication or even a noticeable diminution in the incidence of the disease "

In their report Griffith and Munny summarize the results of the investigation of 6,963 cases of pulmonary tuberculosis in Great Britain Out of 2,769 cases in Scotland, 160 yielded strains of bovine type Out of 3,671 cases in England, 79 were found to be of bovine type The proportional frequencies of the bovine infection were higher in all regions in Scotland than in England, the percentage being highest in Orkney Islands, 25.8 per cent, rural districts in the mainland of northeastern Scotland, 9.1 per cent, rural districts of the rest of Scotland, 5.2 per cent, north and middle England, 2 per cent, and northern England, only 0.6 per cent "The anatomical evidence, previous cervical and abdominal glandular and bone and joint tuberculosis, in about one-third of the cases in Scotland and one-fourth of those in England, strongly suggest the digestive tract as the channel of entry for the bacilli "

Pulmonary tuberculosis of bovine origin is summarized by Cut-

#### ENGLAND STATISTICS

Number of Cases	Per cent
126 Cervical Glands	50 Bovine type
191 Lupus	48.7 Bovine type
60 Scrofulderma	36.8 Bovine type
553 Joint and Bone cases	19.5 Bovine type
23 Genito-Urinary	17.4 Bovine type
265 Meningeal cases	24.6 Bovine type
187 Necropsies	22.5 Bovine type
23 Miscellaneous	8.7 Bovine type

#### SCOTLAND STATISTICS

Number of Cases	Per cent
93 Cervical Glands	51.6 Bovine type
13 Lupus	69.2 Bovine type
218 Bone and Joint cases	29.8 Bovine type
42 Genito-Urinary	31 Bovine type
203 Meningeal cases	29.6 Bovine type
290 Necropsies	32.4 Bovine type
14 Miscellaneous	71.4 Bovine type

bill and Allen as follows "The number of cases of pulmonary tuberculosis due to the bovine type bacilli among 2,101 cases in a sanatorium was 48, or 2.28 per cent, the highest so far recorded in England. In 16 of these cases, infection most probably occurred from milk and in 19 cases no direct evidence of any source of infection was found, although milk-borne infection could not be excluded. Evidence of infection by direct contact with cattle was strongly suggested in 10 cases. Details are given of three families in each of which two members were found to have pulmonary tuberculosis of bovine origin. The original source of infection in each family was probably contact with tuberculous cattle and the subsequent infection of the other member probably due to human transmission of bacilli of the bovine type."

Considering for a moment other aspects in regard to the matter of transmission, swine are ordinarily highly susceptible to the bovine tubercle bacilli and are infected quite readily when exposed under natural conditions that exist on the average farm in the corn belt of the Middle West. Swine are susceptible also to the avian tubercle bacillus, but here again, a generally accepted opinion prevailed that, although swine were subject to infections by the avian bacilli, the disease was confined almost entirely to lymph nodes of the alimentary system, the disease rarely, if ever, became progressive in swine and, therefore, was of little consequence. As a result of this accepted opinion, it was generally assumed that the elimination of tuberculosis in cattle would automatically eliminate the disease in swine insofar as tuberculosis was concerned as an economical factor in the marketing of these animals. By the late 1920's, retentions and condemnation of swine carcasses in packing establishments maintaining Federal inspection in the Middle Western states reached a point where the situation was viewed by packers and the livestock industry with considerable apprehension. Finally, the large slaughtering establishments that formulate the meat packers' institute agreed to pay farmers and shippers of swine a premium of ten cents per cwt. for swine shipped direct to them from modified, accredited counties. The reasoning back of this movement was not founded entirely upon eleemosynary tendencies but was offered mainly as a means of stimulating interest among swine breeders and feeders in support of the county area tuberculosis eradication program in their respective counties. Thus it was believed that, by increasing these activities, it would serve a two-fold purpose: first, it would hasten the accreditation of counties and, since the incidence of bovine tuberculosis must be reduced to less than 0.5 per cent among cattle in such counties to become accredited, the losses in connection with the slaughter of cattle from such counties would be

materially reduced, second, progressive tuberculosis resulting in the high condemnation of swine at slaughter was due to bovine tuberculosis contracted by exposure to tuberculous cattle and therefore, this would, in turn, solve the problem of losses confronted on account of tuberculosis in swine While it was hoped that this inducement would serve a dual purpose, the paramount reason for this gesture on the part of the packers' institute was ostensibly to reduce the economic losses in the slaughter of swine infected with tuberculosis During the 3 years of this procedure, approximately \$3,000,000 00 was paid in premiums to the shippers of slaughtered swine from modified, accredited areas After what was considered a reasonable trial period, it was discovered that retentions and the condemnations of swine at slaughter were continuing at a rate that was out of proportion to the incidence of tuberculosis in cattle in accredited counties It could hardly be reasoned that porcine breeding stock infected from previous exposure to tuberculous cattle in those areas were still responsible for perpetuating the disease among slaughter swine to such an extent Although Van Es and others, including veterinarians in the Bureau had devoted considerable time, over a period of years, to the study of various phases of the avian tuberculosis situation, this state of affairs attracted the attention of Feldman at the Mayo Foundation in Rochester, Minnesota In 1936, he reported the results of a study of 30 specimens of lesions which were obtained from swine condemned on account of tuberculosis at an abattoir in southeastern Minnesota, in which 24 of 30 cases were found to be due to the avian tubercle bacilli As a result of this rather startling disclosure, the Bureau of Animal Industry conducted a similar study at its animal disease station in Beltsville, Maryland, and was able to confirm the findings reported by Feldman It is now generally conceded that a high percentage of condemnations on account of tuberculosis in swine slaughtered at packing centers in the Middle Western area is a result of the avian tubercle bacilli While avian tuberculosis is not considered to be more than remotely infectious for man, it is quite apparent now that conclusions regarding the ability of the avian type of bacilli to produce progressive tuberculosis in swine were evidently based upon information involving too few cases and resulted from a lack of adequate investigation By the same token, human tuberculosis was not considered pathogenic for cattle until recently It was generally recognized that cattle exposed to the human bacilli would develop a sensitization to tuberculin which would cause positive reactions, but this was viewed largely as a transitory condition and little significance was attached to the human bacilli as a matter of concern in cattle other than the confusion which it caused in

the interpretation of the tuberculin test, a condition which must of necessity be tolerated for the lack of a practical test possessed with greater specificity than tuberculin. It was a generally recognized fact that human beings who were discharging bovine tubercle bacilli from open lesions would readily infect cattle that were exposed to such contaminant, but for all general purposes it was thought that the human bacilli had little or no ill effect on cattle other than this particular undesirable influence which it exerted on the tuberculin test. Although long suspected by those directly engaged in the field of bovine tuberculosis eradication, the transmission of the disease and the fact that human tubercle bacilli will cause pathological lesions of tuberculosis in cattle are matters of relatively recent acceptance. At times different research workers have paused to consider the matter of mutation as a potential possibility under certain favorable conditions but this is still regarded, more or less, as a problematical phenomenon. However, there are those engaged in field activities who have witnessed conditions that strongly suggest such possibility and, in view of some of the beliefs concerning transmission which have been found to be erroneous during the present generation, further prosecution of this phase might lead to some similar situation.

In order to epitomize the subject, bovine tuberculosis should probably be referred to as a disease that commonly affects cattle and swine, is transmissible to certain other domestic animals, only to a slightly lesser degree, is infectious for some species of mammalian wild life, and one to which man himself is also susceptible. Therefore, in effect, the disease is not alone a matter of economic importance in the production of dairy and breeding cattle and to the swine industry, but is also a question of public health significance.

By virtue of this fact, a program was inaugurated in the United States in 1917 which had for its objective the ultimate eradication of bovine tuberculosis. This enterprise was inspired and fostered by various individuals and groups and the movement was launched in face of what appeared to many to be a humanly impossible task that would only result in a waste of time, effort and money. A larger portion of the support behind this task came from those who were directly connected or closely affiliated with the livestock industry and others with allied interests, although there were still others less directly concerned who were intensely interested and displayed much enthusiasm in the enterprise. The optimism that prevailed among the various individuals that composed this group of pioneers is responsible in a large measure for the success thus far attained. The disease incidence among dairy and breeding cattle in this country at that time was estimated



at approximately 4 2 per cent with the greater portion of these diseased animals being located in the milk sheds that supply the large metropolitan areas with milk and its by-products for human consumption. The mean average for the dairy and breeding cattle population in this country during the past twenty-five years approximates about 63,000,000 animals. Thus far, in the conquest of bovine tuberculosis, approximately 279,500,000 tuberculin tests have been applied in more than 22,000,000 lots of animals scattered throughout the nation and have resulted in the condemnation of about 3,892,000 animals that revealed positive reactions to these tests. The peak of activities in this campaign was reached in the fiscal year of 1935, and during that year, 25,237,532 animals were subjected to tuberculin tests, resulting in the condemnation of 376,623 animals that gave positive reactions to these tests. Since that year, there has been a gradual decline in the number of cattle tested annually, due in part to the man power shortage caused by the war, but mainly as a result of the continued lowering of the disease incidence, thereby reducing the frequencies of tests necessarily required to preserve the situation during the control era. Only 19,534 positive reactor animals were slaughtered in the entire United States during the fiscal year of 1945, which is quite a contrast to the number disclosed ten years previous and is equivalent to only about 0 03 per cent of the entire dairy and breeding cattle population of the country.

The uniform methods and rules adopted shortly after the co-operative bovine tuberculosis eradication project was inaugurated provided that, when the incidence of bovine tuberculosis had been reduced to 0 5 per cent as a result of the actual tuberculin testing of all dairy and breeding cattle within its borders followed by the immediate slaughter of all positive reactors, the county as a unit would then be designated by the U S Bureau of Animal Industry and the cooperating State Department in the state where such county was located as a modified, accredited area for a period of three years. A somewhat similar procedure was also provided for the re-accreditation of such counties upon termination of the three-year period. There are 3,069 counties in the United States, and the last one of these was accredited in November, 1940, approximately twenty-three years after the project was undertaken and, incidentally, that county is located in the state of California. Consequently, all states, including the municipalities of Puerto Rico and the Virgin Islands, now enjoy the distinction of this classification by virtue of the fact that all areas within their borders are modified, accredited areas.

Professor H R Smith, general manager, National Livestock Loss Prevention Board, presents the following under the caption "Bo-

vine Tuberculosis Declines 98 per cent " "The Federal meat inspection records, which give us a true picture of conditions, show that in 1916, the year before the national tuberculosis eradication campaign was started, 2 35 per cent of all cattle slaughtered had tuberculous lesions, as compared to 0 96 per cent in 1908, increasing two and one-half times in the eight-year period. If nothing had been done and if it had continued at the same rate to the present time, today, 50 per cent of our cattle would be infected with the disease. But the situation was brought to the attention of legislative bodies and something was done. With adequate appropriations from Congress, State legislators and county boards, and with an efficient army of veterinarians ably directed by Federal and State sanitary officials, tuberculin testing was done so thoroughly that, by 1943, only 0 48 per cent of all cattle slaughtered under Federal inspection showed lesions and were retained for the disease—a reduction of 98 per cent from the 1916 figure. The number of beef carcasses condemned has been reduced from 40,746 in 1917 or 0 43 per cent of the total killed to 1,248 or 0 01 per cent in 1943, also a reduction of 98 per cent. In Chicago the reductions have been 99 per cent in each case." A further reduction in both retentions and condemnations is reflected in the percentage figures for the fiscal year 1945, which reveal but 0 4 per cent of the animals slaughtered under Federal inspection during the year were retained for tuberculosis and only 0 09 per cent of these were condemned.

Again Professor H R Smith, states "Since 1917, with the gradual removal of nearly all tuberculous cattle, there has been a constant decrease in the tuberculosis death rate among humans in the United States from 22 5 to 3 5 in 1942 (84 per cent). During the same period, there was a decrease of 68 per cent in the human death rate from respiratory tuberculosis."

Unfortunately, statistical data on typing during the greater part of this period are not of sufficient volume to determine the extent that bovine tuberculosis eradication actually played in this very gratifying reduction in the human death rate. Therefore, conclusions in this respect are for the most part based upon circumstantial evidence which, of course, presents a matter of conjecture, but it is believed with all candor that achievements attained in this project have been a contributing factor of more than meager proportion.

The U S Bureau of Animal Industry, in a release issued by the Department of Agriculture through the USDA Publication, January 7, 1946, estimates "that nearly 40,000 animals or sixteen million pounds of beef a year, which would otherwise have been condemned as unfit for human consumption, are saved as a result

of the bovine tuberculosis eradication campaign During the last fiscal year (1945) about fourteen and one-half million cattle, exclusive of known reactors, were slaughtered under Federal inspection Only 0.04 per cent were found to be tuberculous and only one in 10,000 was sufficiently infected to warrant condemnation But when the campaign began, condemnations were thirty times as frequent Meat inspection and livestock shipping records are of value in tracing tuberculous cattle to their home premises, in order that any remaining infected cattle may be eliminated Although our cattle as a whole are now remarkably free from the disease which troubles the livestock industry of many other countries, unsuspected centers of infection are frequently found But the vast saving in beef has paid for the eradication campaign many times over, not to mention the far safer milk supply we secure as a dividend "

Although bovine tuberculosis is now at low ebb among cattle in the United States, this should not be construed to mean that all danger therefrom to man, cattle, or any other mammalian species is non-existent An occasional focus of infection is disclosed and frequently a number of animals in a single unit or individual herd are found diseased Even though dwarfed by percentage terms when applied to the cattle population of the county, state or nation as a whole, yet such animals serve as a potential dangerous element to those in direct contact, in addition to those less directly connected, who may consume milk or its by-products that have not been rendered safe

In conclusion, it appears obvious that we have arrived at a point in this country when the dissemination of bovine tuberculosis is no longer a matter of serious concern Sporadic cases of the disease will inevitably occur in mammals from time to time, be they man or animal, until the disease is finally extirpated It may also be postulated that a definite challenge may now be encountered toward any further appreciable reduction in the incidence of tuberculosis in cattle, so long as tuberculosis exists in any form to plague human or animal life

Dr A E Wight, who at that time directed tuberculosis eradication in livestock for the Federal Bureau of Animal Industry, says "Now that tuberculosis in cattle has been reduced to a small fraction of 1 per cent as a result of the systematic Federal-State campaign of eradication, veterinary officials are concerned about the danger of tuberculosis-free herds becoming re-infected One way that this can happen is from persons who have pulmonary tuberculosis, present evidence indicates " A case is cited in which four herds of cattle were infected by one person Because of this danger,

he urges close cooperation between public health officials and veterinarians engaged in bovine tuberculosis eradication

It is also probable that, when more data are available in countries where bovine tuberculosis is much more prevalent today, in view of a greater tendency for typing, plus the effects of a prolonged war, human tuberculosis in all clinical varieties, including pulmonary tuberculosis caused by the bovine tubercle bacilli, will reveal a very conspicuous increase. This potential reflects not alone the extremely favorable situation for those fortunate enough to live in the United States but also the eminence attained by this country in the field of tuberculosis eradication in cattle, an achievement not emulated by any other country and one to which we point with scintillating pride as reminiscent of the fact that bovine tuberculosis is a constant menace to human health, life and general welfare, it is economically destructive and insidious, yet a disease possible of eradication

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\*Appreciation is expressed to Dr A B Crawford, superintendent, Animal Disease Station, U S Bureau of Animal Industry, Beltsville, Maryland, for assistance rendered in supplying some of the references used

### SUMMARY

Following discovery of the tubercle bacilli by Professor Koch, three types of the organism were soon recognized immunologically as separate and distinct entities, i e, the human, bovine and avian. For several years thereafter, Koch, as well as many other reputable scientists in the field of bacteriology, contended that host-species in each category would not contract tuberculosis when exposed to other types of the bacilli and, therefore, bovine tuberculosis was not transmissible to man. However, that conclusion was later exploded and Koch, after much reluctance, finally changed his former opinion in the premise. Consequently, the transmission of tuberculosis from animal to man soon became a generally accepted fact but not without reservations as to its clinical effects. A consensus of opinion prevailed that, although transmissible to man, the condition produced by the bovine tubercle bacilli was confined mainly to certain circumscribed limitations such as glandular or lymph node infections and tuberculosis of the bone and joints, but it was not considered to be more than passively capable of producing pulmonary lesions of tuberculosis. With the development of better methods and more practical means of typing, greater stress in recent years has been attached to the importance and desirability of identifying the type of bacilli actually responsible for the disease when it occurs in man. Today the bovine bacilli stand convicted not only as the causative agent of a variety of clinical forms, including progressive tuberculosis in

man, but pulmonary tuberculosis of bovine origin has been established either clinically or on autopsy in an increasing number of human cases, particularly in European countries where tuberculosis flourishes to a much greater extent among cattle at the present time. Also an increasing number of generalized cases of tuberculosis in humans attributed to the bovine bacilli have been reported in several of these countries.

Thus far in the conquest of bovine tuberculosis, approximately 279,500,000 tuberculin tests have been applied in more than 22,000,000 lots of cattle scattered through the United States, resulting in the condemnation and slaughter of approximately 3,892,000 animals that revealed positive reactions to these tests. Following this systematic process of tuberculin testing of cattle at regular intervals since the inauguration of the eradication project in 1917, the incidence of the disease has been reduced to 0.5 per cent in all of the 3,069 counties in the United States and all municipalities in Puerto Rico and the Virgin Islands, and these states and municipalities have enjoyed the distinctive classification of officially modified accredited areas since November 1, 1940. During the fiscal year 1945 about fourteen and one-half million cattle, exclusive of known reactors, were slaughtered under Federal meat inspection. Only 0.04 per cent were found to be tuberculous and only one in 10,000 was sufficiently infected to warrant condemnation.

Therefore, it appears obvious that we have arrived at a point in this country when the dissemination of bovine tuberculosis is no longer a matter of serious concern. Sporadic cases of the disease will occur in mammals from time to time, be they animal or man, until the disease is finally extirpated. It may also be postulated that a definite challenge may now be encountered toward any further appreciable reduction in the incidence of tuberculosis in cattle so long as tuberculosis exists in any form to plague human or animal life.

It is probable, when more data is available in countries where bovine tuberculosis is prevalent to a considerably greater extent among cattle today, in view of a greater tendency toward typing, plus the effects of a prolonged war, that human tuberculosis in all clinical varieties, including pulmonary tuberculosis caused by the bovine tubercle bacilli, will reveal a very conspicuous increase. This potential reflects not alone the extremely favorable situation for those fortunate enough to live in the United States but also the eminence attained by this country in the field of tuberculosis eradication among cattle, an achievement not emulated by any other country, and one to which we point with scintillating pride as reminiscent of the fact that bovine tuberculosis is a constant menace to human health, life and general welfare and, although

economically destructive and insidious, yet, a disease possible of eradication

### RESUMEN

Pronto después del descubrimiento del bacilo tuberculoso por el Profesor Koch, se reconocieron tres tipos del organismo como entidades separadas y distintas, desde el punto de visto inmunológico, a saber el humano, el bovino y el de las aves. Durante varios años, Koch, lo mismo que muchos otros hombres de ciencia prominentes en el campo de la bacteriología, afirmaron que la especie-huésped en cada categoría no contraería tuberculosis como resultado de su exposición a otros tipos del bacilo y, por consiguiente, que la tuberculosis bovina no podía ser transmitida al hombre. Sin embargo, esa conclusión fue refutada más tarde y Koch, aunque con mucha reserva, cambió por fin su opinión anterior sobre este punto. Consiguientemente, la transmisión de la tuberculosis del animal al hombre pronto llegó a ser un hecho generalmente aceptado, aunque con ciertas restricciones en cuanto a sus efectos clínicos. Prevalció la opinión colectiva de que, aunque transmisible al hombre, la condición causada por el bacilo de la tuberculosis bovina estaba confinada principalmente dentro de ciertos límites circunscritos, tales como las infecciones glandulares y de los ganglios linfáticos y la tuberculosis de los huesos y las articulaciones, pero se consideraba que no era capaz de producir, sino pasivamente, lesiones pulmonares de tuberculosis. Con el desarrollo de mejores técnicas y de medidas más prácticas para determinar el tipo, en los últimos años se ha insistido más sobre la importancia y conveniencia de identificar el tipo de los bacilos que son realmente responsables por la enfermedad cuando ocurre en el hombre. Al presente se condena a los bacilos bovinos no solamente como agentes causales de una variedad de formas clínicas, inclusive de la tuberculosis progresiva en el hombre, sino que se ha establecido el diagnóstico de tuberculosis pulmonar de origen bovino, ya clínicamente o por autopsias, en un número creciente de casos humanos, particularmente en países europeos, donde la tuberculosis es actualmente mucho más común en el ganado. En algunos de estos países se han presentado también informes relativos a un número creciente de casos de tuberculosis generalizada en seres humanos imputable a los bacilos bovinos.

En la conquista de la tuberculosis bovina se han llevado a cabo, hasta ahora, aproximadamente 279,500,000 pruebas a tuberculina en más de 22,000,000 de lotes de ganado esparcidos a través de los Estados Unidos, lo que ha resultado en la condenación y matanza de aproximadamente 3,892,000 animales que revelaron reacciones positivas a estas pruebas. Subsiguiente a este proceso sistemático de comprobar con tuberculina al ganado con intervalos regulares

desde la inauguración del proyecto de erradicación en 1917, se ha reducido la frecuencia de la enfermedad al 0.5 por ciento en todos los 3,069 Condados de los Estados Unidos y todas las municipalidades de Puerto Rico y las Islas Vírgenes, y estos Estados y municipalidades han merecido, desde el 1º de Noviembre de 1940, la distinguida clasificación oficial de zonas autorizadas modificadas. Durante el año fiscal de 1945 se mató, bajo inspección Federal de carne, catorce y medio millones de reses, exclusive de reactores conocidos. Se descubrió que sólo el 0.04 por ciento eran tuberculosas, y solamente una en 10,000 estaba lo suficiente infectada para justificar su condenación.

Por consiguiente, parece evidente que en este país hemos llegado al punto en que la diseminación de la tuberculosis bovina no es ya una cuestión de gran importancia. De cuando en cuando ocurrirán casos esporádicos de la enfermedad en mamíferos, sean ya animales o seres humanos, hasta que sea extirpada finalmente la enfermedad. Se puede postular también que, de aquí en adelante, podrá encontrarse gran dificultad en reducir apreciablemente la frecuencia de la tuberculosis en el ganado mientras exista tuberculosis en cualquiera forma para infectar al hombre o a los animales.

En vista de la mayor tendencia a determinar el tipo ahora, y de los efectos de una guerra prolongada, es probable que cuando se obtenga más datos de países donde la tuberculosis bovina prevalece hoy en sumo grado entre el ganado, se revelará un aumento muy conspicuo de la tuberculosis humana en todas sus variedades clínicas, inclusive de la tuberculosis pulmonar causada por los bacilos de la tuberculosis bovina. Esta posibilidad refleja no solamente la situación, en extremo favorable, de las personas que tienen la buena suerte de vivir en los Estados Unidos, sino también la eminencia alcanzada por este país en el campo de la erradicación de la tuberculosis entre el ganado, hazaña ésta que no ha sido emulada por ningún otro país, y que la presentamos con orgullo centelleante como recordativa del hecho de que la tuberculosis bovina es una amenaza constante a la salud, vida y bienestar general humanos y de que, aunque económicamente destructiva e insidiosa, es, sin embargo, una enfermedad posible de erradicar.

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## DISCUSSION

KARL H PFUETZE, M.D, F C C P

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Mr Chairman and members of the College I would like to compliment Dr O'Rear on his most interesting information and timely paper Most physicians are aware in only a vague sort of way of the astounding accomplishment of the veterinarians of the United States in reducing so drastically the incidence of tuberculosis of cattle in this country since 1917 As the statistics clearly show the results obtained during this relatively short period, have been truly remarkable It has been achieved by the ruthless application of the one sure method of eradicating tuberculosis among domestic animals, i e the tuberculin test and the slaughter of the reactors Considering the results obtained, the cost has not been excessive, approximately 250 million dollars That the task could be accomplished, provides an amazing example of man's ability to utilize his scientific knowledge to free his environment of formidable and insidious factors that threaten his life and economic well being

As Dr O'Rear's paper shows, it is extremely significant that in those countries which have no bovine tuberculosis control program, the incidence of infection among cattle remains very high, and there is a relatively high incidence of infection among humans with the bovine type The gains made in this country in controlling bovine tuberculosis can be maintained and advanced only by exercising constant vigilance As long as a single tuberculous animal remains, the possibility of the transmission of the infection to healthy animals and to humans exists, the goal must be complete elimination of the disease

The splendid accomplishment of the veterinarians thus far, in the program to eradicate bovine tuberculosis, constitutes a magnificent challenge to all physicians and laymen alike, who are



working for the elimination of tuberculosis among humans We cannot be satisfied with the gains made in the control of human tuberculosis while this disease still remains the number one killer of our people between the ages of fifteen and forty-five years

Dr O'Rear has well pointed out the danger to humans of infection from tuberculous cattle To me, however, the greatest lesson to be learned from his excellent paper is that such an achievement was made possible by means of the simple tuberculin test, plus active cooperation on the part of all agencies concerned, official and unofficial, working with the veterinarians By all odds, the biggest problem in tuberculosis control among humans is *prevention* We must prevent the *spread* from infected to non-infected persons We now have at our disposal, the tools to do the job By means of mass x-ray surveys, the tuberculin test and careful follow up of contacts of known open cases, we can find the carriers of tuberculosis and isolate them

It will not be an easy task It will require a tremendous amount of work and huge sums of money But the end will justify the effort and expense, both in money and human values, many times over What the veterinarians have done to control tuberculosis in cattle, we physicians should be able to do in controlling tuberculosis among humans The late Chester Stewart aptly pointed to the problem at the meeting of the College in Chicago in 1944, when he asked "Do our calves mean more to us than our children?"

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## Discussion

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Dr O'Rear has presented facts which have never been properly recognized or appreciated by a large bloc of physicians in human medicine, as well as nurses and public health workers in this country Tuberculosis in man produced by the bovine type of tubercle bacillus is an extremely serious problem wherever the disease has not been controlled among the cattle herds Other domestic animals, such as dogs, cats, horses, sheep, swine and even parrots, develop tuberculosis from the bovine type of bacillus and may transmit it to man Ever since the world's first school of veterinary medicine was established at Lyons, France in 1762, veterinarians have strived to control tuberculosis among cattle They have always given two reasons for the necessity of control first, that the disease is contagious to man and, second, that it constitutes a serious economic problem

Large numbers of physicians of human medicine long opposed the belief that tuberculosis in cattle is transmissible to man. Indeed, Koch himself stoutly maintained that there was not a bovine type of tubercle bacillus until Smith proved its existence. Then he insisted that the bovine type is not pathogenic for man, even though Ravenel isolated it from tuberculous lesions in humans first in 1902. As late as 1908 he said that bacilli of the bovine type can occur in man, but with few exceptions they are but slightly virulent and remain localized. This view was accepted by many physicians who added to it the belief that the bovine type of tubercle bacillus results in immunity to the human type of organism, and therefore they opposed the veterinarians' eradication program on the grounds that the bovine type of bacillus should be present in dairy products in order that children might be immunized. This view was rather generally accepted although there was no scientific evidence that dependable immunity develops in the human body from any type of tubercle bacillus, and thus eradication of tuberculosis among the cattle herds of this country was definitely retarded. However, such physicians as M. P. Ravenel, Charles H. Mayo, W. H. Park and D. C. Lochead came to the rescue and gradually broke down the opposition of physicians.

The bovine type of tubercle bacillus produces primary tuberculosis in the human body in the same manner as the human type. The primary complex develops and the tissues become sensitized to tuberculo-protein from either type of organism. Wherever there has been a high incidence of tuberculosis among the cattle and living bovine type of tubercle bacilli were consumed in milk and other dairy products, the control of tuberculosis among animals resulted in a marked decrease of tuberculin reactions among children. In fact, the nation-wide tuberculosis control among cattle probably was the most important factor in bringing about the low incidence of tuberculin reactors among the present generation of children.

The bovine type of tubercle bacillus causes the same kind of re-infection type of lesions as the human type. In 1910 Park estimated that in New York City the bovine type was responsible for about 10 per cent of all infants dying from tuberculosis. He and Krumwide made bacteriological analyses and reviewed similar work of others on 1511 cases and found that 66 per cent of the generalized tuberculosis in children was due to the bovine type of bacillus. In 1933 Chang reported on a study of 200 cases of extrapulmonary tuberculosis in the Lakeville State Sanatorium in Massachusetts. The bovine type of bacillus was responsible for 71 per cent of the lesions in the age period from one to five years, 56 per cent from six to ten years, 34.4 per cent from eleven to sixteen years, and

11 per cent for those over seventeen years The average for all age periods was 27.5 per cent

Dr O'Rear has called attention to the situation as reported by Griffith and others in England, where tuberculosis has not been controlled among the cattle and approximately 40 per cent of the animals have tuberculous lesions The Committee on Tuberculosis in War-time of the National Research Council of Great Britain reported in 1941 that an extremely serious situation existed with reference to tuberculosis in man caused by the bovine type of bacillus There had been a recent relative increase of 50 per cent of tuberculous meningitis among children which was thought to be due in large part to disease contracted through dairy products

In 1908 Koch stated that the bovine type of tubercle bacillus had not been definitely demonstrated in a single case of chronic pulmonary tuberculosis in man In fact, by 1922 only four such cases had been reported in the world However, an intense study of this subject revealed that such cases are not uncommon Indeed, in 1937 Griffith reported 163 such cases in Great Britain In European countries it was found that from 1 to 6 per cent of all chronic pulmonary tuberculosis in man was due to the bovine type of bacillus

Hedvall, of Sweden, in 1942 published a monograph entitled, "Bovine Tuberculosis in Man," in which he presented 94 cases, of whom 53 had pulmonary lesions In 28, the pulmonary disease was of the reinfection type, markedly exudative in 19, and cavities were present in 20 Sixteen of these 28 patients had died by the time he made this report Griffith, Hedvall and others have proved that the former belief that the bovine type of tubercle bacillus has a low virulence for man is untenable Indeed, they have found that it is impossible to differentiate between lesions produced by the two types of organisms except by actually typing the organisms Thus, it becomes apparent that in the United States the control of the bovine type of tubercle bacillus in cattle must have played a considerable role in the reduction of the infection attack rate, the morbidity and the mortality of tuberculosis in man over the past two decades Therefore, at every opportunity we should pay tribute to the veterinarians, who early developed a clear vision of tuberculosis control among animals, overcame what at times seemed almost insurmountable opposition, solved a serious economic problem, markedly reduced primary tuberculosis and prevented much illness and death from the reinfection type of tuberculosis in humans

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# Editorial

## TUBERCULOSIS IN HOSPITAL PATIENTS

In 1925 Ralph Kinsella and his co-workers introduced routine x-ray film inspection of the chests of all persons admitted to the St Mary's Hospital in St Louis. Later when an appraisal was made of the routine procedures, such as urinalysis and serologic tests, it was found that the x-ray had revealed more evidence of previously unsuspected conditions than any other. Therefore the staff was of the opinion that routine x-ray inspection of the chest should be continued and extended to hospitals everywhere. Stewart and Mills (1933) reported on a one-month period when the Swedish Hospital in Minneapolis administered the tuberculin test to all entering patients and the entire personnel. Chests of the reactors were inspected with x-ray films and those with shadows were completely examined to determine etiology of lesions. A total of 149 persons were so observed, of whom 47 per cent were found to have progressive pulmonary tuberculosis, previously unsuspected. An identical program was instituted by Diehl at the University of Minnesota Hospitals in 1936 and by Harrington at the Minneapolis General Hospital in 1938 with results that proved conclusively that every person admitted to a hospital for any purpose, as well as all members of the personnel, should be adequately examined for tuberculosis. In 1940 the American Hospital Association published a monograph by Oatway entitled, "The Management of Tuberculosis in General Hospitals." This could well be adopted as a text in every hospital.

Bogen examined the 2200 patients in an institution for the mentally ill (1934) and found that tuberculous infection increased among them according to the length of their stay in the institution, which indicated that many of them contracted the infection after admission. Later Burns, Hilleboe and a number of others found a high incidence of tuberculosis among inmates and personnel of hospitals for the mentally ill, prisons, etc.

Some of the surveys conducted in general and special hospitals have been done in the ideal manner by making x-ray inspection of the chests of all tuberculin reactors and completing the examination with reference to etiology of disease casting shadows, as well as complete examinations of all reactors for extrathoracic tuberculous lesions. Others have consisted of almost nothing but x-ray inspection of the chest with diagnoses made from shadows alone.

In this issue of *Diseases of the Chest*, Scatchard and Duszynski present excellent observations on patients admitted to the Edward J Meyer Memorial Hospital in Buffalo from July 8, 1944 to March 12, 1945. The study was initiated largely because of the high percentage of student nurses who developed tuberculosis lesions. This is a thoroughly dependable report because final diagnoses were not made from x-ray shadows alone. For example, among the patients admitted to the hospital over this period, 37 per cent presented shadows of lesions previously unsuspected by the patients. Although these shadows suggested the presence of tuberculosis, only the 18 per cent which were proved to be tuberculous by the presence of tubercle bacilli in the sputum or by post-mortem examination are reported as tuberculous. Certainly, the worthwhileness of this project cannot be challenged. Not only should the patients be informed of the presence of tuberculosis, but all other patients as well as personnel and visitors should be protected against contagion. The authors make the excellent recommendation that a tuberculosis control program be instituted in every general hospital. Obviously, the manner of conducting such a program depends upon several factors such as size of hospital and incidence of tuberculosis in the community.

Two screening processes should be applied everywhere, namely, the tuberculin test and x-ray film inspection of the chest. Each person who reacts to tuberculin has tuberculous lesions somewhere in the body. A relatively small number of such persons have gross lesions demonstrable by x-ray film inspection at the time of their first examination. Nevertheless the reactors whose films are clear at the moment may have lesions evolve to clinical proportions at some subsequent time. Therefore all reactors should be informed of the presence of tuberculosis before they leave the hospital and be strongly advised to have periodic examinations, never limited to but never omitting x-ray film inspection of the chest.

Inspection by x-ray should be made of every adult who enters a hospital regardless of the tuberculin reaction inasmuch as unsuspected nontuberculosis conditions of the chest, including the heart, may be revealed in this manner. X-ray inspections may be made from the usual 14 x 17 inch celluloid or paper films or photo-fluorograms. All of these are now in extensive use, and it has been shown that the results are essentially the same, regardless of which technique is used. Therefore the local facilities, expense, etc., are determining factors. Hilleboe and Weber have called attention to the fine opportunities in tuberculosis control by adequate examination of the 15 million patients admitted to hospitals annually and a like number seen in out patient departments of these institutions.

As far as hospital personnel is concerned, exposure to contagious tuberculosis is dangerous, whether the patient be on a tuberculous or nontuberculous service. To infect or reinfect such persons as members of personnel, other patients, and visitors, on either service is inexcusable, since we now have methods of detecting contagious tuberculosis promptly, and strict isolation technique has been developed to protect those who come in contact with contagious cases.

J A M

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## Editorial

### PNEUMOPERITONEUM TREATMENT OF PULMONARY TUBERCULOSIS

Since 1931, artificial pneumoperitoneum has been in use for the treatment of pulmonary tuberculosis. Its application for this purpose was discovered incidentally when in a case of intended artificial pneumothorax, air was injected into the peritoneal cavity. Since then, rapid strides have been made in its widespread clinical use. Subsequent research studies brought about a clear understanding of the mechanics of the therapeutic efficacy of this measure. Basically, its influence upon the lung is in no way different from that of artificial pneumothorax. It is known that the therapeutic effectiveness of the latter is conditioned upon adequate pulmonary relaxation. A perview of available investigative data indicates that the same holds true of artificial pneumoperitoneum. If this is so, pneumoperitoneum, of necessity, has definite curative potentialities in pulmonary tuberculosis.

Let us look at the available pertinent information. Accurate measurements have demonstrated that, by systematically maintained pneumoperitoneum, one is able to attain a substantial elevation of the diaphragm. Of course, no satisfactory diaphragmatic rise can be anticipated when the diaphragm is fixed by adhesions. In individuals without extensive diaphragmatic adhesions, elevation of the diaphragm by air injected intraperitoneally is followed by a shortening of the apico-basal diameter of the lung. This may amount to as much as 7.3 cm. Expressed in other terms, the distance between the apex and base of the lung, as measured on a standard roentgenogram, can be reduced by 32.8 per cent on inspiration and by 34.3 per cent on expiration. The decrease in the apico-basal diameter of the lung by artificial pneu-

moperitoneum is associated with a considerable reduction in the volume of the lung. An even greater reduction in the lung volume can be established by the combination of phrenic nerve operation and pneumoperitoneum.

Induced reduction in the lung volume signifies pulmonary relaxation. The latter initiates a number of changes in the lung which, potentially, are conducive to the healing of the tuberculous lesion. These are: 1) Relative tissue anoxemia, 2) Accumulation of carbon dioxide, 3) Lymph stasis, 4) Approximation of cavity walls, 5) Lessened bronchogenous, lymphogenous and hematogenous spread, 6) Diminished absorption of toxins.

There is ample experimental and clinical proof of the inimical effect of these changes upon tubercle bacilli, and of their beneficial influence on the resorption of pulmonary exudate and also, on the formation of fibrous tissue. In other words, artificial pneumoperitoneum offers the necessary pre-requisites of healing.

Pneumoperitoneum has a wide field of applicability in the treatment of pulmonary tuberculosis. It is well to remember in this connection that it is preferable to treat unilateral cases with the combination of phrenic nerve operation and pneumoperitoneum, although, in some instances, pneumoperitoneum alone may bring about gratifying results. When pneumoperitoneum is given as an independent therapeutic measure, it can always be supplemented by a phrenic nerve operation if circumstances so require.

It must be emphasized that pneumoperitoneum is not a competitive procedure as far as other forms of pulmonary relaxation therapy are concerned. Sound clinical practice necessitates that it should be looked upon as part and parcel of a well-conceived and well-integrated, *selective* therapeutic system. With this in mind, it is interesting to see that, according to the great majority of reports in the literature, this more or less new therapeutic approach is becoming a standard measure, in spite of occasional endemic therapeutic prejudice.

The subject of indications for pneumoperitoneum is too large to be discussed within the short space of this writing. For details, the reader is referred to numerous publications and texts which appeared during the past few years. However, there are certain items which deserve special attention.

Pulmonary hemorrhage may be effectively checked by pneumoperitoneum when it is impossible to induce artificial pneumothorax and in cases where one is unable to ascertain from which lung the bleeding originates. Following induced pneumoperitoneum, the consequent relaxation may seal the ruptured blood vessel. The resulting less negative intrapleural pressure reduces the intrapulmonary blood flow and thereby decreases or stops the hem-

orrhage Also, it is interesting to recall that similar results may be expected from the diminished inspiratory descent of the diaphragm The latter will decrease the flow of blood through the inferior vena cava into the right auricle This, in turn, means lessened amounts of blood driven to the lungs by the right ventricle

In recent bronchopneumonic and pneumonic tuberculosis of the lung, artificial pneumothorax is bound to invite the development of empyema The grave consequences of the latter should serve as a deterrent to the use of pneumothorax in these instances Pneumoperitoneum which, naturally, is free of this complication should be looked upon as the treatment of choice in patients with these types of lesion On the other hand, one can *a priori* predict failure of treatment with pneumoperitoneum when patients are selected whose lung lesion is characterized by extensive fibrosis or by rigid-walled cavities Furthermore, one should never forget that it is a mistake to use pneumoperitoneum as a last resort

Brock of North Carolina, pointed out at the last annual meeting of the College in 1946 the remarkable effect pneumoperitoneum has on the closure of tension cavities His statement is worth quoting "When a phrenemphaxis is done on one side, followed by pneumoperitoneum, two things are accomplished First, the high rise of the diaphragm relaxes the lung and thereby facilitates drainage Secondly, there is a marked relaxation of the lung and bronchial tree There is little shortening of the bronchi and little narrowing of their lumina during expiration and this allows for continuous drainage through patent bronchi This also allows for healing of the endobronchial lesion With the introduction of pneumoperitoneum in acute bilateral advanced disease with tension-cavity formation in the Negro, drainage may be so adequate that the disease may clear entirely In my opinion, such disease in the Negro has been looked upon as fatal, and such a result could not have been obtained by any other method of collapse therapy at our disposal "

The more frequent use of artificial pneumoperitoneum in a large group of patients with far advanced bilateral pulmonary tuberculosis deserves a great deal of thought These are individuals—who may be called the "forgotten men" of the institutional population—for whom no form of mechanical relaxation therapy is being offered in accordance with conventional concepts Artificial pneumoperitoneum may bring about welcome changes in a great many of these cases In addition to improvement in their pulmonary condition which may prove curative or may prepare the patient for major surgical intervention, one may observe the favorable effect of pneumoperitoneum on the competency of cough and on the course of intestinal tuberculosis The incidence of the latter,



whether it is recognized or not, is high in far advanced pulmonary tuberculosis

Some recent discussions of this subject admit the usefulness of pneumoperitoneum in controlling pulmonary tuberculosis in women when the treatment is given postpartum. This recommendation clearly recognizes the favorable therapeutic potentialities of pneumoperitoneum which result from the elevation of the diaphragm and from the consequent relaxation of the diseased lung. If this is so, it is difficult to comprehend why should not the same hold true of men and nonpregnant women who have pulmonary tuberculosis of the same kind and extent. Also, it is hard to conceive why is the value of pneumoperitoneum as a psychologic measure emphasized in particular. Over-emphasis of the psychologic effect of pneumoperitoneum by some clinicians connotes a metaphysical trend of thought which has no room in sound clinical practice.

In closing, just a few words about statistical analyses. It is a foregone conclusion that the end results of pneumoperitoneum treatment will be always unsatisfactory if unsuitable cases are selected for treatment. This generic truth applies to any form of therapy. Also, it is self-evident that when this treatment is given for too short a time or with unsuitable technique, the therapeutic result will be poor. Therefore, for the benefit of the patient as well as for the sake of scientific accuracy, a scrupulous selection of cases for this treatment and adequate technique are mandatory. Only correct and objective clinical judgment will protect the welfare of the patient and is likely to contribute to a competent evaluation of the therapeutic results.

—A.L.B

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## Retiring President's Address

CHARLES M HENDRICKS M.D, FCCP \*

*El Paso, Texas*

About twenty-five hundred years ago in a small city in Asia Minor a philosopher who was called Heraclitus propounded the revolutionary proposition that the only thing that does not change is change itself Everything, said Heraclitus, becomes everything is and is not Quite understandably, his words were ignored If only because of their incomprehensibility However though vague and slightly paradoxical they were in keeping with his rank of philosopher and metaphysician and today we have come to accept his theory that everything is in a constant flux Nothing is static

I do not believe there are many who will differ with Heraclitus over the continuance of change We all have seen too many alterations even in the past 30 years, particularly, in the more highly civilized countries, to think otherwise These years will go on record as being an exceptional period of unrest and change of strife and movement of invention and scientific progress, during which things spiritual and material, economic and social, have been shaped and moulded, destroyed and recreated, to an extent probably never before witnessed by a single generation

The greatest change we have seen without doubt has been in people themselves Their mental, physical, and moral health have been on a definite decline throughout the world While this may be somewhat anticipated in European and Asiatic countries, where war and inefficient economies have rampaged, giving leeway to disease, famine, and poverty in general, we should not have expected the breakdown of moral values and personal integrity in the United States that we have seen demonstrated by black markets, illegal war profiteering, alcoholism, increased gambling, parent and juvenile delinquency, and the other social maladies that have so flagrantly prevailed

Some of these changes are undoubtedly due to the influence of World War I, the inflationary boom that followed it, the depression, and World War II There is good cause to believe that these distressing times put a stress and strain on people that affected their metabolism in such a way that their very traits of character were depleted Profound students claim that personality and character traits are closely related to fundamental metabolism Certainly this is a point worth investigating It has been pointed out many times in the past that conditions leading to two bloody world wars within 25 years among the most civilized nations of the world may be attributed to a lack of proper education Many educators have recently stated that our present system of education is the most colossal failure in history

We most assuredly are aware that the low salaries for teachers that exist in all countries have kept the best talent from this important profession and, consequently, young people have been deprived of proper training in building sound morality A recent survey revealed that there are 7,000,000 children between the ages of 5 and 17 not now in school One teacher in 10 now holds a sub-standard certificate There are 53

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\*Presented at the 13th Annual Meeting, American College of Chest Physicians, June 7, 1947, Atlantic City, New Jersey

per cent less students in teachers colleges There are 50,000 vacant teaching positions There are 10,000 closed classrooms More than 10,000,000 American adults are functionally illiterate Thirteen per cent of the men in the Armed Services during the war were illiterate

In the educational systems, particularly in the United States, there has been a tendency to stress scientific training—the knowledge of the mechanistic principles of life, social training has been almost wholly ignored In consequence, science has progressed while morality has lagged far behind Without proper instruction in this field, young people have found constant difficulty in adapting themselves to the many varied problems that they meet in life Though imbued with mechanistic know-how, they are almost completely illiterate in social values and integrity

The field of medicine has not escaped having its face lifted, either The past 40 years have been pregnant with scientific development Perhaps the future generations will acknowledge this period to be one of progress, more fruitful than ever previously encountered in the slow march of the preceding centuries Not long ago the general practitioner was a heart specialist, lung specialist, stomach specialist, skin specialist, obstetrician and surgeon all fused into one Death always lurked around the corner Typhoid and small pox came most every Spring and every Fall Scarlet fever, diphtheria, and pneumonia took their annual toll Those were the days when the doctor depended almost wholly on the capability of living tissue to remedy or remove disease or repair injury Needless to say, the modern doctor has transcended all that, for by learning to conquer the acute infections and to control epidemics, we are left with diseases of unknown cause, as accounting for the majority of illnesses today

Admitting this great improvement of the medical scene, we nevertheless find the medical profession drastically illiterate concerning many things Just as general education has ignored training in social problems, so has medicine ignored chronic illnesses and socio-economic factors in its worthy institutions of training While antibiotics and vaccines have thrown many acute infections for a concrete loss, the chronic illness problem has grown Now, such diseases as cancer, arthritis, and diseases of the circulatory system have risen to take the lead in mortality and suffering While it is axiomatic that in our field one disease diminishes only to be replaced by another, it also is evident that these chronic illnesses are more than merely substitutes for those already controlled They are the most dangerous antagonists known to man And while little is known to man concerning these malignant diseases, that "little" is not being distributed to our medical students Instead, they graduate, capable of treating the diseases already defeated, but practically uninformed concerning this killer and disabling of man the chronic disease

The seriousness of this situation is more apparent when we note that the present trend in population is towards a large number of older people, because it is the older people who are the most susceptible to chronic diseases By this, I do not mean to imply that younger people are not in danger The facts in the case show that nearly half the sufferers of chronic diseases are under forty-five and 70 per cent of them are under fifty-five

Statisticians report there is to be an exceptionally large number of people at 65 and over in the coming years In 1950, the number of

adults 65 and over will equal the number of children under 5 years of age. This shifting of numbers in age groups also affects our military situation. If we should be forced into a war anytime during the next 20 years, we will find it difficult, indeed, to muster 15,000,000 men for the armed forces, if we employ the same physical standards used in World War II.

Our profession is an integral part of society, affecting and being affected by the changes that are brought about.

The failure to realize that it must change as society changes has been one of the most characteristic features of medicine in all ages. The present is no exception—we hold in a certain arrogance to the belief that the present form of medicine is vastly superior to those of all preceding ages. Medical progress has shown a crystallization on a line of endeavor. This line has been followed long after its usefulness has passed. It has been followed until the form of medicine was no longer suitable to the time and part of the public wants to discard it. We have seen this happen in group health plans. People have demanded less expensive medicine, and have not received what they asked for. As a result, we see such radical departures from a reasonable solution as the Wagner-Murray-Dingell bill.

The only successful answer then is that we in the field of medicine keep ourselves adjusted to the times, making certain that we are working in the right direction toward the right goals. The first step in affirming this policy would be to make provisions for the change in our population. Fully aware of the facts that by 1960, one-sixth of the population will be over 60 years of age, that one in six of the present population has a chronic disease, that mental diseases equal and probably surpass physical diseases, we must dig in now to bring forth pertinent information about the etiology and therapy of the chronic illnesses, that we may successfully take this rearrangement in our stride. We must not hesitate to wage open warfare on this scourge, availing ourselves of every possible facility, for if we cannot protect older people from its devastation, if we cannot protect longevity from becoming a painful burden, then those accomplishments in giving longer life are but wasted effort.

Pathology is but one of the problems of chronic diseases. While basically the most important, it must be supplemented by proper hospitalization. We have found this essentially true in the treatment of acute illnesses, but the need is even greater when it comes to arranged treatment of long-term diseases. When a man is sick, the only thing that should face the physician is his need for hospitalization. If the patient cannot be adjusted to a home-care program, for various commonplace reasons, then he should be admitted into a hospital and accorded the treatment that corresponds with his illness. If he needs a hospital bed for a year, two years, or for duration of his life, he should have it. Certainly, the fact of requirement is the important point and not the length of time for which it will be needed. No greater harm can be done than to transfer a patient out of any hospital before his problem has a solution or before permanent scarring has taken place.

In our own field, Diseases of the Chest, there is a proneness to discharge patients with acute respiratory diseases from under our care when the acute symptoms subside without a complete checkup. I firmly believe that this practice is responsible for the development of many chronic diseases of the chest. This point should be studied because

herein may lie the solution to the prevention of many diseases such as bronchiectasis, emphysema, and asthma

I regret to say, however, that in this chain of reasoning, concerning the hospitalization of both acute and chronic cases, there is a "missing link" We all well know that this link is none other than the hospital itself There are far too few hospitals, too few nurses and technicians, and a mal-distribution of complete medical care

The American people have plagued the medical profession with this query for the last 15 years, and, excepting a small amount of the individual health groups organized by private physicians, little has been offered to alleviate this condition As I said before, we are now faced with a social "touchstone," the Wagner-Murray-Dingle bill, because the profession has dogmatically stuck to the tenets of private enterprise rather than compromise Unfortunately, those people who cannot afford adequate medical care and those who represent them, do not feel as strongly against collectivism as most of us

In short, when surveying the medical problems that we seek to improve upon, we cannot help bumping into ordinary factors of everyday life This only reveals more clearly the influence that society and the medical profession have upon each other The medical profession, therefore, cannot hope to remain isolated upon a high social pinnacle and look down upon the turbulent masses The doctor belongs with his patient, whether in treating his ailment, or in assisting him in his personal problems

The trouble is that many of us confuse medical practice with medical science While great benefits have been achieved from medical research and the research in other fields, these have fundamentally been the work of the scientist and not the practitioner

Certainly medical research must be continued and increased, in fact, there is a great need for the research worker in medicine to team up with the research scientists in allied fields The great challenge of cancer, poliomyelitis, and the diseases of the circulatory system, among other malignant diseases, will require great organization and mutual assistance among all branches of scientific research

But it takes the practitioner to deal with human beings, to apply that knowledge gained by the laboratory scientist There is an old adage which quite appropriately fits, it says "you cannot carry an experiment bleeding from the laboratory to the bedside" The medical research scientist and the practicing physician each has his proper and equally important place, and it would be a grave error to confuse their talents or duties

Despite these scientific trends found in general practice, I think the physician of today realizes more and more that many diseases are psychosomatic insofar as they include both the emotional and the physical mechanisms He has learned that a better knowledge of psychiatry will make him more capable in handling the stresses exhibited by the patient

The upshot of the American medical perspective may be found once more with friend Heraclitus, that the only thing that does not change is change itself Too long we have maintained a tunnel-vision attitude towards the public need for better medical treatment at a lower cost Now, before we are faced with a legal mandate, namely, socialized medicine, we must integrate our resources with those of other fields that we may more successfully achieve our goal Medical indigency is

more than a problem between doctor and patient. Every person who is medically or mentally ill is a problem to the community at large. If we are to prevent wastage of human resources and maintain a peaceful world, we must build upon a solid foundation of good health.

The past 30 years have brought about great improvement in the internal relationships of our profession. The old antagonisms, jealousies, and prejudices have, for the most part, given way to a spirit of tolerance and cooperation. Let us now join hands in the same spirit with the educator, the sociologists, the clergymen, the financier, the industrialist, and the statesman, because, only by the coordination of all the fields of human endeavor, can we hope to create a new and better era for people and for medicine.

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MAJOR GENERAL SHELLEY U. MARIETTA  
P R E S I D E N T  
AMERICAN COLLEGE OF CHEST PHYSICIANS  
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## Major General Shelley U Marietta

### Installed as College President

Major General Shelley U Marietta was installed as President of the American College of Chest Physicians at the annual meeting of the College in Atlantic City, June 5-8, 1947

General Marietta was born in Iowa in 1881 and attended grade high school and college in Des Moines, Iowa. He graduated from the Dental Department at Drake University in 1902 and practiced dentistry in Des Moines for three years, being a member of the dental faculty of the University during this period.

He graduated from the Medical Department, University of Illinois Chicago, in 1909 and after serving one year of rotating internship, entered medical practice in Des Moines, Iowa, remaining there for a period of one year, entering then on active duty in the Medical Reserve Corps of the Army. General Marietta graduated from the Army Medical School, Washington, D C, in May 1912 and was commissioned in the Regular Army Medical Corps. After serving at the Presidio of Monterey California, he was assigned to duty in September 1912 at the Army tuberculosis hospital at Fort Bayard, New Mexico, where he remained for two years. During this period, he was trained in the administration of artificial pneumothorax and assisted in a few operations of rib resection anteriorly and posteriorly over the upper chest to encourage the collapse of tuberculous cavitation in the presence of pleural symphysis. This was the beginning of the use of such procedures in the Army hospitals. He then served a two-year tour of duty at Corregidor and Manila in the Philippine Islands, returning to the United States in August 1916. After seven months' duty at Corpus Christi, Texas as Inspector-Instructor with the Texas National Guard, he was transferred to San Antonio, Texas, for duty with the Recruiting Depot at that point. In July 1917, General Marietta was assigned as commanding officer of the base hospital at Camp Gordon, Georgia, and sailed for France in June 1918 as commanding officer of Base Hospital No 43 (the Emory Unit). He spent 14 months in France, including periods in the Hospital Center, Savenay, France, Headquarters, American Expeditionary Forces, Tours, France, Headquarters, American Expeditionary Forces, Antwerp, Belgium, and as Commanding Officer of the Army Hospital in Brest which was later expanded to include the hospital center at Kariwan.

He returned to the United States in August 1919 and served as Commanding Officer, General Hospital No 8 at Otisville, New York. At the termination of this duty in the fall of 1919, General Marietta was given a refresher course in tuberculosis at New Haven, Connecticut, and was then detailed to Walter Reed General Hospital as Assistant Chief of the Medical Service until February 1920 when he was assigned to duty at Fitzsimons General Hospital, Denver, Colorado, and acted there as Assistant Chief, and Chief of the Medical Service for a period of three and a half years. He also acted as an instructor in physical diagnosis in the school established there for students sent to that hospital for special instruction and supervised the study over a period of two years of the Deycke-Muth partial antigens for the treatment of tuberculosis. These antigens had been developed in Germany, prior to World War I, and a considerable supply of the materials were procured and sent to the United States for investigation. The antigens consisted of separate ex-



tracts of the protein, carbohydrate and fatty components of the tubercle bacillus. An extensive literature was provided and the study was made by a group consisting of a chemist, three or four clinicians, a group of nurses and several technicians. A fairly extensive study including controls was made and report rendered to the Surgeon General of the Army at intervals of the progress of the work. The product was considered after the two-year interval to be of little or no value in the treatment of tuberculosis and the study was abandoned.

Following the tour at Fitzsimons General Hospital, General Marietta continued in professional work, devoting a total period of approximately 22 years of his service to this field and serving at the Station Hospital, Fort Sam Houston, Texas, Letterman General Hospital, San Francisco, Walter Reed General Hospital, Washington, D. C., Tripler General Hospital, Honolulu, T. H., again at the Station Hospital, Fort Sam Houston, Texas, and at Walter Reed General Hospital. In the fall of 1928 he was a student for three months at the Mayo Foundation, Rochester, Minnesota. In December 1939 he was advanced to the grade of Brigadier General and assigned as Commanding Officer of Walter Reed General Hospital. He was appointed Commanding General of the Medical Department Professional Service Schools (Medical, Dental, Veterinary, Dietetic, Physical Therapy and Technician Training) in February 1941, and in September 1943 was promoted to the grade of Major General. Through choice he remained also as Commanding Officer of Walter Reed General Hospital during this entire period.

General Marietta was retired for age January 31, 1945 and returned to active duty the following day, remaining on duty until February 9, 1946.

General Marietta is a Life Member and Fellow of the American College of Chest Physicians, a Fellow of the American Medical Association, a member of the Association of Military Surgeons, Fellow of the American College of Physicians, and a diplomate of the American Board of Internal Medicine. He is a member of the Eta Chapter of Alpha Kappa Kappa and of the Illinois Chapter of Sigma Xi.

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## Section on Diseases of the Chest in the American Medical Association

A resolution proposing the establishment of a Section on Diseases of the Chest in the Scientific Assembly of the American Medical Association, which was sponsored by the American College of Chest Physicians, was brought before the House of Delegates of the American Medical Association at their annual session and was unanimously accepted. The acceptance of this section in the American Medical Association is an important step forward for the chest specialists in that it establishes for all time the specialty of diseases of the chest.

Dr. Walter E. Vest, Huntington, West Virginia, a Fellow of the College and a member of the House of Delegates of the American Medical Association, introduced the resolution. A number of the Delegates were instructed by their state medical societies to support the resolution.

### RESOLUTION

WHEREAS, There are approximately 2,500 physicians and surgeons in the United States engaged in the practice of diseases of the chest, and

WHEREAS, This specialty has made notable progress in advancing the knowledge of diseases of the chest during the past ten years, and

WHEREAS, A total of 388 chest specialists registered at the annual session of the American Medical Association held at San Francisco July 1-5, 1946, and

WHEREAS, The registration exceeded this total in but four of the seventeen sections of the American Medical Association, i.e., Internal Medicine, Surgery, General and Abdominal, Obstetrics and Gynecology, and the General Practice of Medicine, and

WHEREAS, Diseases of the chest constitute a very large and important segment of the entire volume of medical practice, therefore be it

RESOLVED, By the House of Delegates of the West Virginia State Medical Association, that our delegates to the American Medical Association be instructed to present this resolution in the House of Delegates at the coming session in Atlantic City, with the request that a Section on Diseases of the Chest be established in the Scientific Assembly of the American Medical Association.

The Resolution was referred to the Reference Committee on Sections and Section Work.

### ABSTRACT OF REPORT OF REFERENCE COMMITTEE ON SECTIONS AND SECTION WORK

Dr. Roy B. Henline, Chairman, presented the following report:

"3 Resolution on Establishment of Section on Diseases of the Chest. Your committee received a resolution introduced by Dr. Walter E. Vest, West Virginia, regarding the establishment of a Section on Diseases of the Chest. The resolution points out that there are about 2,500 physicians engaged in the practice of this specialty, that an enormous amount of progress has been made, that the subject is of enormous import to the American people, and that the general welfare would be served by the establishment of such a section. After hearing from eight Fellows of the Association, who appeared before it, your reference committee is of the opinion that it is advisable to establish such a section, and to that end the committee recommends that section 3 of article 5 of the Constitution be amended by deletion of the figures "175" and the substitution

therefor of the figures "176", and that the By-Laws be amended by adding to section 1 of chapter 15 a newly numbered section, as follows "No 19 Section on Diseases of the Chest" The committee further recommends that in the interim the Council on Scientific Assembly allot a portion of the program of the Section on Miscellaneous Topics at the next annual session to the subject of diseases of the chest, and that at that time a section be organized to be known as the Section on Diseases of the Chest "

*Respectfully submitted,*

Roy B Henline, Chairman

Edgar V Allen

Burt R Shurly

Lowell S Goin

Scott Lord Smith

"Dr Henline moved adoption of the third section of the report of the reference committee dealing with the Resolution on Establishment of Section on Diseases of the Chest, and the motion was seconded by Dr Thomas S Cullen, Maryland After discussion and suggestions of amendments, it was moved by Dr E Vincent Askey, California, seconded by Dr Walter E Vest, West Virginia, and carried, that the House approve a Section on Diseases of the Chest as a section of the Association

"Dr Askey then moved that this be referred to the Committee to Study Revision of the Constitution and By-Laws so that that committee may take appropriate steps to see that the new section has the proper representation in the House of Delegates, and the motion was seconded by several and carried

"On motion of Dr Henline, seconded by several and carried, the report of the reference committee as amended was adopted as a whole "

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# THIRTEENTH ANNUAL MEETING

## American College of Chest Physicians

The Thirteenth Annual Meeting of the American College of Chest Physicians, recently concluded in Atlantic City, was one of the most successful meetings the College has ever had. Registration for the four day meeting, June 5-8, was the largest for any of the College meetings. There were 655 physicians registered for the scientific assembly, and the total, including wives and guests, exceeded 1,000.

<i>States</i>	<i>REGISTRATION</i>	<i>No Registered</i>
Alabama	.....	5
Arizona	.....	4
Arkansas	.....	1
California	.....	24
Colorado	.....	18
Connecticut	.....	9
Delaware	.....	6
District of Columbia	.....	23
Florida	.....	8
Georgia	.....	5
Idaho	.....	2
Illinois	.....	33
Indiana	.....	5
Kansas	.....	2
Kentucky	.....	10
Louisiana	.....	2
Maine	.....	3
Maryland	.....	16
Massachusetts	.....	22
Michigan	.....	14
Minnesota	.....	10
Mississippi	.....	3
Missouri	.....	9
Montana	.....	1
Nebraska	.....	2
New Jersey	.....	48
New Mexico	.....	1
New York	.....	114
North Carolina	.....	15
Ohio	.....	22
Oklahoma	.....	4
Oregon	.....	1
Pennsylvania	.....	66
Rhode Island	.....	4
South Carolina	.....	10
Tennessee	.....	10
Texas	.....	20
Utah	.....	1
Virginia	.....	16
Washington	.....	2
West Virginia	.....	9
Wisconsin	.....	6
Wyoming	.....	1
	<b>TOTAL</b>	<b>587</b>

<i>U S Possessions</i>	<i>No Registered</i>
Alaska .....	1
Hawaii .....	2
Puerto Rico .....	8
<i>Other Countries</i>	
Argentina .....	4
Belgium .....	1
Brazil .....	2
Canada .....	16
China .....	1
Cuba .....	9
Czechoslovakia .....	1
Dominican Republic .....	1
England .....	3
India .....	1
Italy .....	1
Lebanon .....	3
Mexico .....	3
New Zealand .....	1
Palestine .....	1
Panama .....	1
Peru .....	5
Philippine Islands .....	1
Scotland .....	1
Switzerland .....	1
TOTAL	68
FINAL TOTAL	655

### COLLEGE AWARD

The first College Award was made this year. The recipient, Dr Jay Arthur Myers, Minneapolis, Minnesota, Past-President of the College and Editor-in-Chief of the College Journal "Diseases of the Chest," was presented with a gold medal especially designed for the College, and a Certificate of Award, for meritorious service in furthering the progress in the field of diseases of the chest. The presentation was made at the general assembly of the College in Atlantic City.

### EXAMINATIONS FOR FELLOWSHIP

On the first day of the meeting, June 5, seventy-two candidates took their oral and written examinations for Fellowship in the College. This is the largest group to date to take the examinations at a College meeting.

### CONVOCATION

At the Second Annual Convocation, held on June 7, thirty-four physicians received their Fellowship Certificates and signed the College Roster. A list of the new Fellows is given later in this report. Dr Richard H Overholt, Brookline, Massachusetts, the President-Elect of the College, presided at the Convocation and Dr Robert Livingston Johnson, Philadelphia, Pennsylvania, President of Temple University, delivered the Convocation Address.

### SCIENTIFIC PROGRAM

An excellent scientific program was presented under the chairmanship of Dr Andrew L Banyal, Milwaukee, Wisconsin, and a great many important matters concerning the specialty of diseases of the chest were discussed at the meeting. Papers presented at the meeting will be published in future issues of "Diseases of the Chest"

### PRESIDENTS' BANQUET

Dr J Winthrop Peabody presided at the Presidents' Banquet and presented a Certificate of Merit, in recognition of valuable services to the College, to Dr Charles M Hendricks, the retiring president

The New Jersey and Pennsylvania Chapters of the College served as hosts for the meeting and the cocktail party which was given by them just prior to the Presidents' Banquet was an outstanding success

### LATIN AMERICAN DINNER

A dinner was given at the Ambassador Hotel, Atlantic City, on the closing day of the annual meeting of the American College of Chest Physicians, for the members of the College from the Latin American countries and their wives. The dinner was planned under the direction of Dr Alberto Chattas of Cordoba, Argentina and Dr Donato G Alarcon of Mexico City served as Toastmaster. After dinner brief talks were made by several of the Latin American Delegates

Dr and Mrs Juan Herradora of Jersey City, New Jersey, gave a cocktail party preceding the dinner, and served as hosts at the annual meeting to the physicians and their families from the Latin American countries

A breakfast meeting sponsored by the Council on Pan American Affairs of the College was held the morning of Sunday, June 8, at which Dr Chevalier L Jackson, Philadelphia, Pennsylvania, Chairman of the Council, presided. Plans were discussed concerning the activities of the College Council during the coming year

### INTERNATIONAL NIGHT DINNER

Thursday, June 5, was International Night at the meeting of the American College of Chest Physicians. A dinner was given in honor of all the members of the College from other countries. Dr Harry C Warren, San Francisco, California, Chairman of the Council on Pan Pacific Affairs of the College, presided at the dinner, and talks were made by several of the honored guests

### NEW COLLEGE OFFICERS

Major General S U Marietta (Retired), Washington, D C, took office as President of the College for the ensuing year, and the following officers were unanimously elected: Richard H Overholt, M.D, Brookline, Massachusetts, President-Elect, Louis Mark, M.D, Columbus, Ohio, First Vice-President, Harry C Warren, M.D, San Francisco, California, Second Vice-President, Joseph C Placak, M.D, Cleveland, Ohio, was re-elected as Chairman of the Board of Regents, and Paul A. Turner, M.D, Louisville, Kentucky, was elected Member-at-Large to the Executive Council. Dr Benjamin L Brock of Chicago, Illinois, has been appointed Secretary-Treasurer of the College

## NEWLY-ELECTED REGENTS AND GOVERNORS

Following is a list of the newly-elected and re-elected Regents and Governors for the College

*Regents*

Edward A Greco, M.D	District No 1
Karl Schaffle, M.D	District No 5
Herbert L Mantz, M D	District No 8
Frank S Dolley, M.D	District No 13
Hastings D Walker, M D	Hawaii
David E Garcia, M.D	Puerto Rico

*Regents in other countries*

Sir Sidney Sewell, M.D	Australia
Juan Tanca Marengo, M D	Ecuador
Gustave Maurer, M D	Switzerland

*Governors*

David H Shipp, M.D	Arkansas
Howell Randolph, M D	Arizona
Arnold Minnig, M.D	Colorado
Edgar W Davis, M D	District of Columbia
M Jay Flipse, M.D	Florida
Orval F Swindell, M.D	Idaho
Charles F Taylor, M.D	Kansas
Francis Welch, M.D	Maine
O C Brantigan, M D	Maryland
Willard B Howes, M.D	Michigan
Merle D Bonner, M.D	North Carolina
D W Heusinkveld, M D	Ohio
Alvis E Greer, M D	Texas
Edgar C Harper, M D	Virginia
John E Nelson, M.D	Washington
George Maxwell, M D	West Virginia

*Governors in other countries*

Angel M Marchand, M D	Puerto Rico
John Bell Ferguson, M D	Victoria, Australia
Jorge Higgins, M.D	Ecuador
Reginaldo Fernandez, M D	Central Brazil
Jose Silveira, M D	Northern Brazil
Eduardo T Etzel, M.D	Southern Brazil
Gilberto V Zamorano, M.D	Valparaiso, Chile
Gonzalo Corbalan T, M.D	Santiago, Chile
Idefonso Garretón Unda, M.D	Concepción, Chile

## Latin American Delegates

### *Argentina*

The following members of the College from Argentina attended the annual meeting of the College in Atlantic City Dr Gonzales Aguilar, Cordoba, Dr Manuel Albertal, Buenos Aires, Dr Alberto Chattas, Cordoba, and Dr Bartolome Pardo, Santa Fe Dr Albertal, accompanied by his wife, were recent visitors to Chicago, and are now visiting in Washington, D C before their return to Argentina Dr and Mrs Chattas, and Miss Feigun, sister-in-law to Dr Chattas, are now touring the United States They will spend some time in New York City and Washington, D C Dr Chattas is appearing on the program at the meeting of the Pan American Academy of Pediatricians

### *Brazil*

Dr Joaquim S Cavalcanti of Recife, Pernambuco, was the only delegate to the College meeting from Brazil Dr Enrico Prado, Belo Horizonte, Brazil, attended the meeting as a guest

### *Cuba*

Dr Gustavo Alderegula, Dr Rene G Mendoza and Dr Antonio Rodriguez Diaz, Havana, Cuba, were delegates to the annual meeting of the College to represent the Cuban Chapter Several other physicians from Havana attended the meeting as guests Dr Alderegula is visiting various cities in the United States before returning to Havana

### *Mexico*

Dr Donato G Alarcon, Regent of the College for Mexico, and Dr Manuel Alonso, Secretary-Treasurer of the Mexican Chapter of the College, both of Mexico City, were delegates to the annual meeting in Atlantic City

### *Republic of Panama*

Dr Maximo Carrizo, Colon, Republic of Panama, represented the Central American Chapter of the College at the Atlantic City meeting Dr Amadeo Vicente Mastellari, Regent of the College for the Central American Chapter, had to cancel his intended trip to the United States at the last moment and therefore appointed Dr Carrizo as delegate to the College meeting from the Republic of Panama

### *Peru*

Three delegates from Lima, Peru attended the Atlantic City meeting of the College They were Dr Max Espinoza Galarza, Dr Juan A Macchiavello, and Dr Leopoldo Molinari Dr Molinari was accompanied by his wife and after the meeting in Atlantic City they visited Chicago for a few days, and made a trip to the Mayo Clinic, in Rochester, Minnesota They are now spending a few days in Washington before returning to Lima

### *Puerto Rico*

An excellent delegation of College members from the Puerto Rico Chapter attended the annual meeting in Atlantic City They were Dr Antonio Acosta Velarde, Santurce, Dr Ramon T Colon, San Juan, Dr Rivero E Martinez, Hato Rey, and Dr Felix M Reyes, Bayamon Mrs Acosta Velarde accompanied her husband to the meeting, and Dr Martinez was accompanied by his wife and two daughters



## European Delegates

### *Belgium*

Belgium was represented at the 13th Annual Meeting of the American College of Chest Physicians by Dr. Pierre H. Nep of Tirlemont.

### *Czechoslovakia*

One physician from Czechoslovakia registered at the annual meeting of the College. He was Dr. Pavel Lukl of Hradec Kralove.

### *England*

Dr. Clifford Hoyle, Dr. John McMichael and Dr. Kenneth Robson, all of London, represented England at the annual meeting of the College in Atlantic City. Dr. Hoyle is Editor of the British Journal of Tuberculosis and Diseases of the Chest.

### *Italy*

Italy was represented at the annual meeting of the College by Dr. Theodoro D. Postell of Bologna.

### *Scotland*

Dr. G. Ewart Martin of Edinburgh, Scotland, attended the Atlantic City meeting of the College.

### *Switzerland*

Switzerland was represented at the Atlantic City meeting of the College by Dr. Gustave Maurer of Davos. Dr. Maurer was elected as Regent of the College for Switzerland at the annual meeting of the Board of Regents in Atlantic City.

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## Far and Near East Delegates

### *China*

Dr. Lincoln Pan of Shaoshing, Chekiang, China, who is studying at the University of Michigan, Ann Arbor, attended the Atlantic City meeting. Dr. Shu Fan Li of Hong Kong sent a message to the College membership regretting his inability to attend.

### *India*

Dr. A. C. Sankara Iyer of Bangalore, India, attended the annual meeting of the College in Atlantic City. Dr. Sankara Iyer is at present located in Weston, Ontario, Canada.

### *Lebanon*

Three Fellows of the College from Beirut, Lebanon, attended the Atlantic City meeting. They are Dr. Halim J. Dewlett, Dr. Papken S. Mugrditchian, and Dr. Charles N. Nucho. All of these Fellows are studying in the United States.

### *New Zealand*

Dr. Rowan Nicks of Auckland, New Zealand, was a guest at the annual meeting of the College in Atlantic City.

*Palestine*

One physician from Palestine attended the College meeting, he was Dr Juda Pauzner

*Philippine Islands*

Dr Miguel Canizares, Governor of the College for the Philippine Islands, and Medical Director of the Quezon Institute in Manila, was present in Atlantic City for the College meeting This was Dr Canizares' first visit to the United States since before the war, and he is making an extensive tour of the country before his return home

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Convocation

The Second Annual Convocation of the College was held June 7, 1947 and the following physicians received their Fellowship Certificates and signed the College Roster

Michael Aronovitch, M.D , Montreal, Quebec, Canada  
Morris M Braverman, M.D , Detroit, Michigan  
Albert E Broome, M.D , Kitchener, Ontario, Canada  
William W Coulter, M.D , Sanatorium, Texas  
James H Cullen, M.D , Yonkers, New York  
Sheldon E Domm, M.D , Knoxville, Tennessee  
Louis L Friedman, M.D , Birmingham, Alabama  
Peter J Galante, M.D , Swannanoa, North Carolina  
Herman Gauthier, M.D , Mont Joli, Quebec, Canada  
Robert Hunter Hayes, M.D , Chicago, Illinois  
George R Hodell, M.D , Houston, Texas  
Perry M Huggin, M.D , State Park, South Carolina  
Harold A. Kipp, M.D , Pittsburgh, Pennsylvania  
Valmore Latraverse, M.D , Montreal, Quebec, Canada  
Ralph Edward Moyer, M.D , Oteen, North Carolina  
James D Murphy, M.D , Oteen, North Carolina  
J Louis Pilon, M.D , Montreal, Quebec, Canada  
Berthold S Pollak, M.D , Jersey City, New Jersey  
Benjamin Paul Potter, M.D , Jersey City, New Jersey  
Arthur Powers, M.D , Hull, Quebec, Canada  
Walter Raab, M.D , Glenn Dale, Maryland  
Leon Ross, M.D , Brecksville, Ohio  
William Ray Rumel, M.D , Salt Lake City, Utah  
John Edmund Runnells, M.D , Scotch Plains, New Jersey  
Irving W Schiller, M.D , Boston, Massachusetts  
Clarence B Schoemperlen, M.D , Winnipeg, Manitoba, Canada  
Elias A Sindel, M.D , Bethlehem, Pennsylvania  
Morris M Snyder, M.D , Chicago, Illinois  
M M Szucs, M.D , Youngstown, Ohio  
Ernest Teller, M.D , Chicago, Illinois  
Paul G Thode, M.D , Fort Bayard, New Mexico  
John Watkins Trenis, M.D , Washington, D C  
Ruth Wells, M.D , Pasadena, California  
John Alexander Wiggins, Jr , M.D , Fort Worth, Texas

## Report of the Executive Secretary

Another year has come and gone since we last met in San Francisco. This past year has been one of readjustment. Many of the College Fellows and Associate Members have been released from the armed services and in order to assist these members in readjusting themselves to civilian life your President, Dr. Charles M. Hendricks, has appointed a Veterans Medical Officers Committee. This Committee is comprised of members of the College who served with our armed forces. The Committee, through the Medical Service Bureau of the College, has made it possible for many physicians to obtain positions in sanatoria, hospitals, and other affiliations. This service is offered gratis to all members of the College and we urge those members who are still looking for positions or who have positions to offer to communicate with the Medical Service Bureau of the College. The Veterans Medical Officers Committee is considering other valuable services for the benefit of their fellow veterans and these will be announced by the Committee as soon as the organization for the administration of these services have been completed.

All of the established councils and committees of the College have been active during the past year and you will hear the reports from the chairmen of these councils and committees during this session. I am sure that you will agree with me that the men who serve on these councils and committees, who have given up a great deal of their time and have traveled to meetings at their own expense, deserve the praise and cooperation of every member of the College. These are the type of men who have built the American College of Chest Physicians to its present high standing in the medical profession.

We can be proud of the Governors and Regents of the College. They are doing yeoman duty and are maintaining the prestige of the College by selective membership. They too, deserve the praise and cooperation of every member of the College.

During the interval between College meetings, the affairs of the College are handled by the Executive Council. In all of my years of working with these officials, I can truthfully say that the members which you have selected to serve on the Executive Councils have given unstintingly of their time and efforts to make the College the kind of a society in which you are proud to hold Fellowship. Without the aid of all of these men and many others too numerous to mention, it would be impossible to bring you this report.

The life-blood of the American College of Chest Physicians is in its chapters. It is only fitting and proper that the future leaders of the College should come up from the ranks through College chapters. The College chapters serve as a sounding-board for the selection of these future leaders. We hope that many of you will take advantage of these opportunities.

The establishment of a proper board for certification of chest specialists is one of the prime objectives of your College and a committee of the College has been working on this problem for a number of years. They will continue the work until this objective is obtained.

Another objective of the College is to establish sections on diseases of the chest in the recognized state and national medical societies. Here, too, progress is being made. We are pleased to announce that the New York State Medical Society at its last annual meeting established a section on diseases of the chest.

The program of the National Council of Tuberculosis Committees of your College to establish tuberculosis committees in every state medical society is now nearing completion. It is hoped that tuberculosis committees will also be organized in many of the county medical societies.

Your Council on Undergraduate Medical Education is sponsoring two books for undergraduate medical students, one on tuberculosis and one on non-tuberculous diseases of the chest. These books are being published by the Charles C. Thomas Company, Springfield, Illinois, and we hope that they will soon be available for distribution.

In postgraduate medical education your Council has arranged the second comprehensive postgraduate course in diseases of the chest to be given in Chicago, September 15-20, under the direction of the Illinois Chapter of the College. The last postgraduate course sponsored by the Illinois Chapter was well received and we know that this course will be even more popular. Similar courses are being planned to be given in other parts of the country and they will be announced in the journal when arrangements have been completed. The emphasis in these courses will be placed on the newer developments in all aspects of diagnosis and treatment of diseases of the chest.

These are but a few highlights of the extensive program which your College has undertaken. Each of them is designed to serve the public and the chest specialist. We believe that medical problems should be handled by physicians who are affiliated with recognized medical societies and we further believe that a specialty society should be comprised of specialists who have met minimum requirements and have passed adequate examinations in their respective fields of endeavor.

We are happy to announce that 72 candidates for Fellowship in the College took their examinations in Atlantic City yesterday.

No report by your Executive Secretary would be complete without mentioning our excellent journal, "Diseases of the Chest." Under the editorship of Dr. Jay Arthur Myers and his splendid editorial board, the journal has reached new pinnacles of success. It is regarded as the leading journal on diseases of the chest in every country throughout the world. From a small beginning, only a few years back, this outstanding achievement is worthy of note and I am sure that the members of the College join with me in paying tribute to the men who have guided the destiny of our journal since its inception.

The new College Directory, listing 2272 members, is now on the press and, barring unforeseen delays, the Directory should be available to the members within the next few months.

One of the notable achievements of the College has been its expansion into other countries and we can truly say that the College today is a world organization.

Our Council on Pan Pacific Affairs reports the growth of the College membership in Australia, China, India, New Zealand, the Philippine Islands, South Africa, Alaska and Hawaii. Our Council on European Affairs has recently begun to function in Europe and we are pleased to announce that in addition to the College chapter in Greece, we now have members in England, Belgium, Switzerland, Norway, Sweden, Egypt, Lebanon, Portugal, Yugoslavia and Italy. Negotiations are now under way to organize all of the European countries and we hope to be able to announce the completion of this organization in the very near future.

It gives me a great deal of pleasure to report to you concerning our activities in the Latin American countries. I have just returned from

an extensive tour of Central and South America. My first stop was in Mexico where I met with the College members. Mexico has a very active chapter with 39 members and plans were discussed for increasing their membership as well as conducting examinations for Fellowship. I am pleased to announce that these examinations will go into effect on January 1, 1948.

After leaving Mexico I visited Guatemala, Costa Rica, and the Republic of Panama where plans were discussed for the organization of a Central American Chapter of the College. I am happy to report to you that this chapter will be organized at San Salvador in August of this year.

I then went to Lima, Peru, to attend the 7th Latin American Congress Against Tuberculosis. In addition to many College members and officials from the Latin American countries, the College was represented by a delegation from the United States comprising Dr. Chevalier L. Jackson, Chairman of the College Council on Pan American Affairs, Dr. Leo Eloesser, Vice-Chairman of the Council on Pan American Affairs, Dr. Jay Arthur Myers, Editor-in-Chief of our journal "Diseases of the Chest," and Dr. Richard H. Overholt, First Vice-President of the College. Dr. Herman E. Hilleboe, a member of our Council on Public Health, attended the Congress as an official representative of the U. S. Public Health Service.

A conference of Governors, Regents and other College officials in the Latin American countries was held on March 19, and a reunion of all College members was held on March 21. These College activities were a part of the Congress and were published in the official program of the meeting.

The 8th Latin American Congress Against Tuberculosis will be held in Mexico City in 1949 and we are pleased to announce that Dr. I. Cosío Villegas, Governor of the College for Mexico, has been elected as President. We have assured Dr. Cosío Villegas that we will have a large College delegation at the meeting in Mexico City in January 1949. Here will be an opportunity for the Fellows in the United States and Canada to meet with the Fellows of the College from all other countries in the Western Hemisphere. You will find them to be splendid fellows and gracious hosts.

Following the Congress at Lima, I proceeded to Chile where a chapter of the College was organized with 51 charter members. Membership applications are still arriving from Chile and we have been promised that there will be at least 75 members in the Chilean chapter.

My next stop was in the Argentine. Here a meeting was arranged by the Argentine Chapter of the College. Plans were discussed for the expansion of College activities there and for the conduct of examinations for Fellowship. We have already received a large number of new applications from the Argentine and we now have a very active College chapter functioning in that country with 86 members.

From the Argentine I flew over to Uruguay where a meeting was arranged by our colleagues in that country. Plans were discussed for expanding our activities in Uruguay and they have requested us to send them 100 application forms.

My next stop took me to Brazil and meetings were held in São Paulo and Rio de Janeiro. A luncheon meeting was sponsored by the central chapter of the College in Rio de Janeiro and this meeting was attended by 54 College members. It was decided that there be at least three

College chapters established in Brazil and possibly a fourth one. The country has been divided into southern, central and northern districts, comprising 19 states and the Federal District, and we are pleased to announce that two of these chapters are already functioning. We hope to be able to announce the organization of a third chapter within the next few months.

From Brazil I had a long flight to Puerto Rico where our College chapter there had arranged a meeting. I am very happy to tell you that the College has a splendid chapter in Puerto Rico of which we may be proud. They are doing good work there and a resolution was adopted at their meeting to establish a board of examiners and commence examining candidates for Fellowship in the College beginning the first of the year.

In all of the countries that I visited the College members were most gracious hosts. Their homes and their hearts were opened to us. I felt that I was not only meeting members of the College, but that I was meeting with warm friends. It was with reluctance that I left each of the countries which I was so fortunate to be able to visit.

It was most fortunate that Dr. and Mrs. Overholt chose this particular time to visit the same countries which I did, and I can say that they were among our best ambassadors of good will. Dr. Overholt gave a series of lectures in each of the countries and they were very well received. I cannot praise too highly the wonderful assistance which he gave to us in our efforts to organize the chest doctors in the Latin American countries. Following his series of lectures in Brazil, Dr. and Mrs. Overholt flew to Venezuela where Dr. Overholt participated in the organization of the Venezuelan Chapter of the College. We have just received a cable from Dr. Baldo, the Governor of the College for Venezuela, announcing this latest addition to our fast-growing family of College chapters.

I wish to extend my deep appreciation and thanks to the many College members in the Latin American countries who helped make this trip so enjoyable. Some of them are attending our meeting here in Atlantic City and we hope that the members of the College in the United States will be just as gracious to them as they have been to me and to your other delegates.

In closing, I want to express my appreciation and thanks to the members of our office staff in Chicago, who have carried on the work of the College during my absence from the country and have so ably assisted me in all of the College activities during the past year. Their loyal support and assistance has helped to make this report of progress possible.

The American College of Chest Physicians, by its world organization is demonstrating the road to peace through cooperation. Here is a wonderful opportunity for men of good will to band together for a common purpose. Disease knows no boundaries. The tubercle bacillus is the same in the Western Hemisphere, Europe, Asia, or any other continent. The distance between countries is being shortened by rapid air travel. To eradicate tuberculosis in one country, we must eradicate it in every other country. Science must find the answers to these problems and it must lead the way. The American College of Chest Physicians intends to do its full part in this progressive movement.

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## Report of the Historian

Mr President, Distinguished Guests and Fellows of the American College of Chest Physicians

It is fitting and proper that we now pause and give thought to the *physicians* who have prepared and passed on to us a glorious heritage as *physicians*

The title *physician* is one which stirs in our mind thoughts of men inspired with a love for humanity and a burning desire to relieve the sick and ailing

The philosophy of medicine is synonymous with the name of Hippocrates Our thoughts are directed toward physiology by Erasistratus The birth of anatomy is inevitably linked with Galen and his eager students who traveled far that they might see his anatomical dissections New anatomical truths are put forth and established by Vesalius Harvey insists that we must recognize the linking of the circulation through the capillary vessels Now come Monro, Turner, Hunter and Padgett to teach the art of surgery founded upon anatomy A new vista opens to those who will but pause to look through Leeuwenhoek's microscope

A terrible stench now assails our nostrils It comes from the amputation wards Fright, pain and suffering is written on the countenance of each patient Death lurks in every nook and cranny of the wards only to be routed by that noble Englishman, Lister, with his carbolic spray (antiseptic surgery) Even now, the energetic Frenchman, Pasteur, is here to tell us that the true cause of such stenches lies in an invisible germ Semmelweis is standing guard at the birth chamber protecting the birth canal against contamination by meddlesome hands soiled with germs We cannot pause, a host of eager faces appear, among whom I see Laennec, Beaumont, Morton, Virchow, Koch, Osler, Walter Reed and Forlanini Halsted is here and the dawn of aseptic surgery is upon us!

Man is destined to bear the frailties of human nature and is prone to err in judgment but the true *physician* never allows his trust to be violated New faces continue to appear, each illuminated through the knowledge of a task well done and of a trust held inviolable

John S Agar, Little Rock, Arkansas  
Henry Barenblatt, Browns Mills, New Jersey  
James Marr Bisallon, Portland, Oregon  
Earl C Carr, Washington, D C  
William A. Clark, Springfield, Ohio  
John Donnelly, Charlotte, North Carolina  
Frank G Dye, Syracuse, New York  
Lee T Ferrell, Albuquerque, New Mexico  
Clyde M Fish, Pleasantville, New Jersey  
Champ H Holmes, Atlanta, Georgia  
Samuel H James, San Fernando, California  
George A Lassman, New York, New York  
Yvon Laurier, Montreal, Canada  
Torrence C Moyer, Lincoln, Nebraska  
Ira D Nelson, Albuquerque, New Mexico  
Michael Smith, West Palm Beach, Florida  
Hyman I Spector, St Louis, Missouri  
Arthur Bruce Steele, Santa Barbara, California  
Fred D Stubbs, Philadelphia, Pennsylvania

Adam L. Szwajkart, Chicago, Illinois  
Angel B. Trinidad, Manila, Philippine Islands  
Joseph Walsh, Philadelphia, Pennsylvania  
Daniel Yellin, San Francisco, California

May we now stand in silent tribute to these physicians who have fulfilled their trust. At this time we renew our pledge to protect and nurture our glorious medical heritage.

*Respectfully submitted,*  
William A. Hudson, M.D., F.C.C.P.

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## College Activities in Latin America

### *Argentine Chapter*

The Buenos Aires members of the Argentine Chapter of the College sponsored a luncheon meeting at the Restaurant La Cabana, Buenos Aires, on April 16 (see photograph). Dr. Raul F. Vaccarezza, Governor of the College for Argentina, presided and introduced Dr. Richard H. Overholt, Brookline, Massachusetts, President-Elect, and Mr. Murray Kornfeld, Executive Secretary, of the College. Mr. Kornfeld read a prepared talk in Spanish outlining the activities of the College. Dr. Overholt gave a series of lectures in Buenos Aires, Cordoba and Rosario. The lectures were demonstrated with slides and motion pictures and a great deal of enthusiasm for the lectures was shown by the members of the College in the Argentine. The following are the officers of the Argentine Chapter:

Gumersindo Sayago, M.D., Cordoba, Regent  
Raul F. Vaccarezza, M.D., Buenos Aires, President  
Agustin Caelito, M.D., Cordoba, Vice-President  
Alvaro E. Bence, M.D., Buenos Aires, Secretary-Treasurer

Three officially appointed delegates from Argentina attended the Thirteenth Annual Meeting of the College in Atlantic City, June 5-8. There were Dr. Manuel Albertal, Buenos Aires, Dr. Alberto Chattas and Dr. Gonzalez Aguilar, Cordoba.

### *Conference in Montevideo, Uruguay*

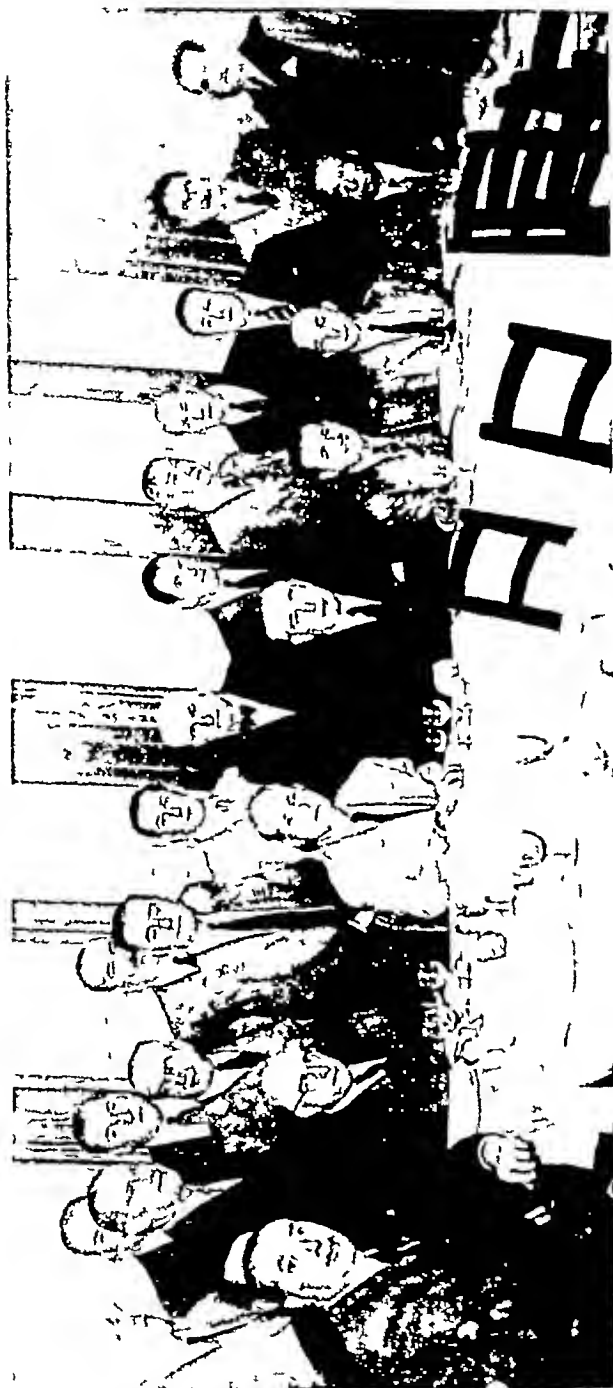
A Conference was held at the Medical Society Building in Montevideo on April 26 with officials of the Tuberculosis Society of Uruguay. Plans for the organization of a chapter of the College in Uruguay were discussed and Dr. Abelardo Rodriguez, Secretary of the Tuberculosis Society of Uruguay, was authorized to send applications for Fellowship and Associate Membership in the College to all physicians in that country who are eligible to apply and who can meet the minimum requirements for such membership. The Conference was attended by the following physicians: Alfonso Civici, M.D., Mariano Scardi, M.D., Ariztes Piaggio, M.D., Raul A. Piaggio Blanca, M.D., Pablo Purriel, M.D., Alijandro Artagabeytia, M.D., and Abelardo Rodriguez, M.D.

The plan for the organization of an Uruguay Chapter of the College was endorsed by Dr. Rodolfo Almeida Pintos, President of the Tuberculosis Society of Uruguay. Dr. Fernando Gomez, Governor of the College for Uruguay, was unable to attend the Conference because of illness.



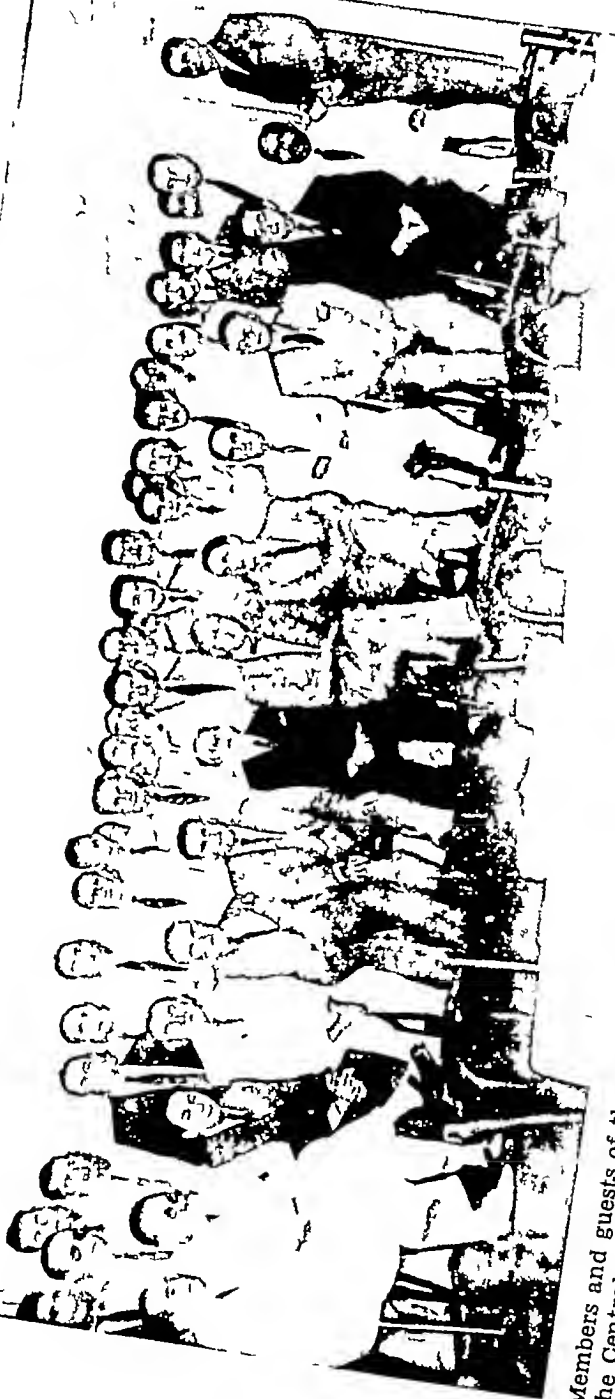
### LUNCHEON MEETING, ARGENTINE CHAPTER

American College of Chest Physicians, Buenos Aires, Argentina, April 16, 1947



Members and guests of the American College of Chest Physicians who attended the luncheon meeting sponsored by the Argentine Chapter of the College at the Restaurant La Cabana, Buenos Aires, April 16, 1947

LUNCHEON MEETING, CENTRAL BRAZILIAN CHAPTER  
American College of Chest Physicians, Rio de Janeiro, Brazil, May 10, 1947



Members and guests of the American College of Chest Physicians who attended the luncheon meeting sponsored by the Central Brazilian Chapter of the College at the Casa do Estudante, Rio de Janeiro, Brazil May 10, 1947

*Conference in Sao Paulo, Brazil*

A Conference was held with Dr Eduardo Etzel, Sao Paulo, Governor of the College for Southern Brazil and plans were completed for the organization of a College chapter in Southern Brazil comprising the states of Rio Grande Do Sul, Santa Catarina, Parana and Sao Paulo. The College now has a number of members in these states and under Dr Etzel's leadership a sufficient number of new members are being added to support this new chapter.

*Central Brazilian Chapter*

A luncheon meeting was given in Rio de Janeiro on May 10 by the Central Brazilian Chapter of the College in honor of Dr Richard H Overholt, President-Elect, and Mr Murray Kornfeld, Executive Secretary, of the College (See photograph). A number of talks were given by officials of the chapter and each speaker stressed the need for close cooperation between physicians everywhere in the world who specialize in chest diseases. Dr Affonso MacDowell, Regent of the College for Brazil, was presented with a token of esteem by Dr Overholt in behalf of the Board of Regents of the College. The following officers were elected and committee appointments made:

Affonso MacDowell, M.D., Regent

Reginaldo Fernandes, M.D., Governor

Mazzine Bueno, M.D., President

Ugo Pinheiro Guimaraes, M.D., Vice-President for the Federal District

Jose Amello, M.D., Vice-President for the State of Rio de Janeiro

Jaime Santos Neves, M.D., Vice-President for the State of

Espirito Santo

Gastao Mattos, M.D., Vice-President for the State of Minas Gerais

Affonso MacDowell Filho, M.D., Secretary

J. M. Castello Branco, M.D., Treasurer

Manoel de Abreu, M.D., Chairman,

Committee on Mass X-Ray Examination

Arlindo de Assis, M.D., Chairman, Committee on B. C. G.

Rafael de Paula Souza, M.D., Chairman, Committee on Public Health

Alberto Renzo, M.D., Chairman, Committee on Hospitals

Valois Souto, M.D., Chairman, Committee on Sanatoria

J. Carvalho Ferreira, M.D., Chairman, Committee on Social Welfare

Aresky Amorim, M.D., Chairman, Committee on Thoracic Surgery

Aloisio de Paula, M.D., Chmn., Committee on Med. Collapse Therapy

Arl. Miranda, M.D., Chairman, Committee on Chemotherapy

A. Ibiapina, M.D., Chairman, Committee on Medical Education

Following the luncheon, Dr Overholt showed a film on lung resection.

*Puerto Rico Chapter*

A dinner meeting was given on May 14 at the Hotel Condado, San Juan, Puerto Rico, by the Puerto Rico Chapter of the College, at the time of Mr Kornfeld's visit there (See photograph). Dr Jaime Pou, President of the Puerto Rico Chapter of the College presided and Mr Kornfeld addressed the members of the chapter on the need for world organization in the specialty of diseases of the chest. The meeting was also addressed by the Commissioner of Health of Puerto Rico. A resolution was adopted by the Puerto Rico Chapter stating that examinations for Fellowship in the College will be given to all new applicants commencing January 1, 1948. The following delegates were designated by

the chapter to attend the Thirteenth Annual Meeting of the College in Atlantic City Antonio Acosta Velarde, M.D, Santurce, Ramon T Colon, M.D, San Juan, Rivero E Martinez, M.D, Hato Rey, Felix M Reyes, M.D, Bayamon, and Juan H Font, M.D, San Juan

The officers of the Chapter are

David E Garcia, M.D, Hato Rey, Regent

A M Marchand, M.D, Santurce, Governor

Jalme F Pou, M.D, Hato Rey, President

Jose A. Amadeo, M.D, Aibonito, Vice-President

Fernando L Buxeda, M.D, Rlo Piedras, Secretary-Treasurer

DINNER MEETING, PUERTO RICO CHAPTER  
American College of Chest Physicians, San Juan, Puerto Rico, May 14, 1947



Members and guests of the American College of Chest Physicians who attended the dinner meeting sponsored by the Puerto Rico Chapter of the College at the Hotel Condado, San Juan, Puerto Rico

## Second Annual Postgraduate Course in Diseases of the Chest

AMERICAN COLLEGE OF CHEST PHYSICIANS

*Sponsored by the Illinois Chapter*

September 15 - 20, 1947

A second annual postgraduate course in diseases of the chest will be given by the American College of Chest Physicians at the Municipal Tuberculosis Sanitarium, Chicago, Illinois, September 15-20, inclusive. This course will be sponsored by and under the active direction of the Illinois Chapter and the Council on Postgraduate Medical Education of the College.

This course is intended to present authoritative information on all of the important recent developments in the diagnosis and treatment of diseases of the chest. For this reason primary and basic material has been eliminated except as it relates to more recent advances.

A feature of the course again will be the luncheon round table discussions, including question and answer periods on controversial matters.

To insure informality and individual attention, the class is limited to thirty members. The tuition fee is \$50.00. When the class is filled no further applications will be accepted. Requests for further information should be sent to the Executive Offices of the College in Chicago. A coupon has been inserted on page 1x of the front pages of this issue to facilitate application.

Hotel accommodations convenient to the location of the course will be arranged on request at the time of acceptance of applications.

An interesting and stimulating program of courses has been arranged by the Medical Education Committee of the Illinois Chapter. Dr. Edwin R. Levine, Chicago, Chairman, Dr. Paul H. Holinger, Chicago, Dr. Minas Joannides, Chicago, and Dr. Arthur S. Webb, Glen Ellyn, Member Ex-Officio.

### POSTGRADUATE COURSE IN DISEASES OF THE CHEST

SEPTEMBER 15 - 20, 1947

TIME	MONDAY	TUESDAY	WEDNESDAY
9 00 a m	Diagnostic Approach to Chest Diseases	Pulmonary Virus Infections	Pneumoconiosis
10 00 a m	Methods of X-Ray Diagnosis	Pulmonary Fungus Infections	Causes of Pulmonary Disability in Emphysema
11 00 a m	X-Ray Diagnosis of Chest Diseases	Nebulization Therapy in Chronic Bronchial Infections	Cardiac Factors in Pulmonary Disease
Luncheon Round Table 12 00-2 00	Correlation of X-Ray Pathological, and Clinical Findings	Acute Pulmonary Conditions	Employability of Respiratory Patients

TIME	MONDAY	TUESDAY	WEDNESDAY
2 00 p m	Pulmonary Segments in Relation to Broncho-Pulmonary Disease	Bronchogenic Carcinoma	Treatment of Asthma
3 00 p m	Laboratory Methods in Diagnosis of Chest Diseases	Mediastinal Tumors	Relation of Allergy to Pulmonary Disease
4 00 p m	Use and Abuse of Bed-Rest	Chest Symptoms of Esophageal Disease	Cardiac Surgery

TIME	THURSDAY	FRIDAY	SATURDAY
9 00 a m	Epidemiology and Control of Tuberculosis	Immobilization of the Lungs in Treatment of Tuberculosis	Clinical Diagnostic Conference
10 00 a m	Diagnosis of Tuberculosis and Evaluation of Activity	Physical Exercise in Treatment of Tuberculosis	Clinical Diagnostic Conference
11 00 a m	Treatment and Prognosis of Tuberculosis in Children	Surgery of Pulmonary Tuberculosis	Clinical Diagnostic Conference
Luncheon Round Table 12 00-2 00	B C G	Rehabilitation	
2 00 p m	Principles of Treatment of Pulmonary Tuberculosis	Psychosomatic Factors in Tuberculosis	
3 00 p m	The Effect of Antibiotics on the Tubercle Bacillus	Allergy and Immunity in Tuberculosis	
4 00 p m	Clinical Application of Antibiotics in Tuberculosis	Effect of Weather on Tuberculosis	

#### DR. OVERHOLT LECTURES IN SOUTH AMERICA

Following Dr Overholt's lecturing tour through Peru and Chile, as published in the May-June issue of "Diseases of the Chest," he continued his trip through South America and gave lectures in Buenos Aires, Argentina, Montevideo, Uruguay, Sao Paulo and Rio de Janeiro, Brazil, and Caracas, Venezuela.

## College Chapter News

### GREEK CHAPTER

The Greek Chapter of the College had its Second Annual Meeting in Athens on May 10, 1947 The newly elected officers for the chapter are as follows

Basil Papanikolaou, M.D., Athens, President  
Kyriakos Katrakis, M.D., Athens, Vice-President  
Nikolaos Jannopoulos, M.D., Athens, Secretary-Treasurer

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### POTOMAC CHAPTER

The Maryland - District of Columbia Chapter of the College presented a resolution before the meeting of the Board of Regents of the College at Atlantic City for approval to change the name of the chapter to the "Potomac Chapter" The resolution was accepted by the Board and the chapter will now be known as the "Potomac Chapter" The chapter comprises the states of Maryland and West Virginia and the District of Columbia

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### MICHIGAN CHAPTER

The Michigan Chapter of the College held an interesting meeting in Detroit on the evening of June 27 with a good attendance of members and invited guests The special guest speakers of the evening were Dr Clifford Hoyle and Dr Kenneth Robson, of London Drs Hoyle and Robson attended the College meeting in Atlantic City and are now visiting various parts of the United States

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### TEXAS CHAPTER

The Sixth Annual Meeting of the Texas Chapter of the American College of Chest Physicians was held at the Baker Hotel, Dallas, Texas, on May 5, 1947 The program as published in the March-April issue of "Diseases of the Chest" was presented with the following exceptions In the place of paper number 3, Dr Howard Smith, F.C.C.P., of Austin, read a paper on "The Importance of Having a Tuberculosis Committee in Each County Medical Society," and the subject of paper number 5, by Dr John Wiggins, F.C.C.P., of Fort Worth, was "Pulmonary Emphysema," instead of "Pulmonary Embolism"

At the business session in the evening, President McCorkle made a report on the work of the Chapter for the preceding year The report of the Secretary-Treasurer was read and approved Dr Howard Smith gave the following report of the Nominating Committee

H Frank Carman, M.D., Dallas, President  
Robert B Homan, M.D., El Paso, First Vice-President  
Elliott Mendenhall, M.D., Dallas, Second Vice-President  
Charles J Koerth, M.D., Kerrville, Secretary-Treasurer

The officers named above were unanimously elected Thirty-three members and eleven guests registered for the meeting

### VENEZUELAN CHAPTER ORGANIZED

A cablegram was received from Dr Jose Ignacio Baldo, Caracas, Venezuela, Governor of the College for Venezuela, announcing the organization of the Venezuelan Chapter at Caracas on May 20 Dr Richard H Overholt, Brookline, Massachusetts, President-Elect of the College, was lecturing in Caracas at the time and took part in the organizational meeting

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### VIRGINIA CHAPTER

The Second Annual Meeting of the Virginia Chapter of the College took place at the Pine Camp Hospital Richmond, Virginia, on Monday, June 23 The following program was presented

"Sarcoidosis"

Edward S Ray, M.D , Richmond

"The Use of Streptomycin in Tuberculosis"

Wyatt E Royce, M.D , Brook Hill

"Bronchography"

L J Buiss, M.D , F C C.P , Richmond

"Bronchiectasis"

Frank Phillip Coleman, M D , Richmond

"Bronchogenic Carcinoma"

M L White, M.D , Charlottesville

"Prolonged Pulmonary Suppuration"

E C Drash, M.D , F C C.P , Charlottesville

A Chapter luncheon was held after which an X-ray Conference was presented The officers of the Virginia Chapter for 1946-47 were Lemuel E Broome, M.D , Danville, President, Edward S Ray, M.D , Richmond, Vice-President, George Welchons, M.D , Richmond, Secretary-Treasurer The newly-elected officers of the chapter will be announcer later Dr Carl W LaFratta, Richmond, served as Chairman of the Arrangements Committee for the meeting

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### WISCONSIN CHAPTER

The Milwaukee Metropolitan Section of the Wisconsin Chapter of the College met for dinner at the Medford Hotel on February 28, 1947 Dr Laurie Lee Allen addressed the meeting on the subject "Non-Tuberculous Pulmonary Lesions" A round-table discussion followed

The dinner meeting on March 28, of the Milwaukee Metropolitan Section, was addressed by Dr Karl Kassowitz who spoke on "Tuberculosis in Children" This was followed by a round-table discussion

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### DR GEORGE R MAXWELL'S BROTHER WINS CADILLAC

Dr Cyrus H Maxwell, Albany, New York, brother to Dr George R Maxwell, Morgantown, West Virginia, Governor of the College for that state, won the 1947 Cadillac Club Coupe which White Laboratories gave away at the annual meeting of the American Medical Association in Atlantic City More than 12,300 doctors registered from Monday, June 9, through Thursday, June 12, for tickets on the car



## Medical Service Bureau

### POSITIONS AVAILABLE

Approved Tuberculosis Sanatorium desirous of obtaining applications for residencies beginning July 1st All types of compression and surgical therapy in the modern treatment of tuberculosis 200 bed hospital, salary range \$180 - \$300, applicants please state experience, previous training age and social background etc Please address Box 154A, American College of Chest Physicians, 500 North Dearborn Street Chicago 10, Illinois

Resident physician wanted for 80 bed tuberculosis sanatorium approved by the A M A and American College of Surgeons Salary to \$250 plus complete maintenance for single man Send photograph and complete record of training and experience in first letter Dr D F Loewen, Medical Director, Macon County Tuberculosis Sanatorium, Decatur, Illinois

Full time resident physician wanted at tuberculosis hospital, all phases of chest work \$350 per month with maintenance for man and wife, three room apartment For further information please address Box 156A American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois

Resident staff physician wanted at 200 bed tuberculosis sanatorium all forms of collapse therapy major surgery, bronchoscopy Salary \$3 700 with complete maintenance For further information address Box 157A American College of Chest Physicians 500 North Dearborn Street, Chicago 10, Illinois

Senior Staff physician and residents wanted at large tuberculosis sanatorium full time departments in pathology and thoracic surgery medical school affiliation \$4800 to \$5400 per annum complete or partial maintenance For further information please address Box 158A, American College of Chest Physicians, 500 N Dearborn Street, Chicago 10, Illinois

Expansion King County Tuberculosis Hospitals in Seattle requires additional staff Excellent facilities, equipment University Medical School affiliation Young men good training interested teaching and research preferred Chiefs of Service \$8400 Staff Physicians \$7200 Resident Physicians \$1800 plus free maintenance Laboratory Technician \$2820 X-ray Technician, \$2520 Medical Record Librarian, \$2400 Maintenance at cost for single persons only Write Firland Sanatorium, Richmond Highlands Washington giving full particulars and enclose photograph

Single physician wanted with at least three years sanatorium experience in diagnosis and treatment of tuberculosis, 125 bed tuberculosis hospital in Hawaii Starting salary \$6400 00 and complete maintenance Send full credentials and available data first letter Please address Box 159A, American College of Chest Physicians 500 N Dearborn Street, Chicago 10, Illinois

Physicians wanted at small privately endowed, Jewish institution with 25 beds, one physician For further information please address Box 165A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois

Position available for physician who has had some training in thoracic surgery or is interested in learning thoracic surgery at sanatorium in northwest Salary at least \$300 per month with maintenance Opportunity to advance For further information please write Box 167A American College of Chest Physicians 500 N Dearborn Street Chicago 10 Illinois

Physician wanted experienced in tuberculosis for position of Assistant Director of Tuberculosis Control in city-county health department of midwest community \$4 500 with full maintenance For additional information please address Box 168A American College of Chest Physicians 500 North Dearborn St Chicago 10, Illinois

Staff physician wanted at tuberculosis hospital in midwest Starting salary \$275 plus maintenance for self and family For additional information please address Box 169A, American College of Chest Physicians, 500 N Dearborn Street Chicago 10, Illinois

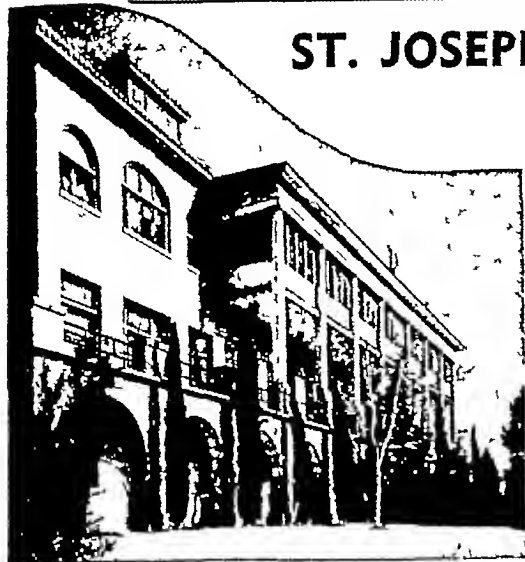
Assistant Resident Physician with some tuberculosis experience wanted for 120-bed bi-county institution All phases of the diagnosis and treatment of tuberculosis are carried out including major surgery California license required although not immediately Furnished apartment is provided for single person or married couple Please outline training and experience in first letter and include a recent snapshot Salary starts at \$425 per month Write Director, Tulare - Kings Counties Joint Tuberculosis Hospital Springville, California

### POSITIONS WANTED

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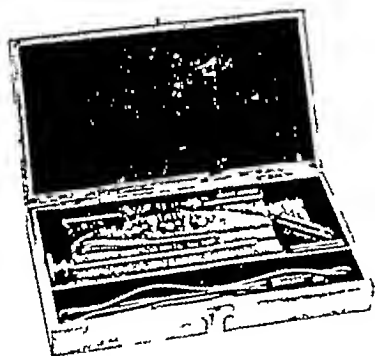
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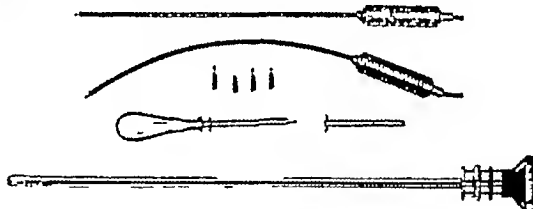
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<b>KULA SANATORIUM</b> Watakoa, Maul, T H	<b>ST JOHNS SANITARIUM</b> Springfield, Illinois
<b>LAUREL BEACH SANATORIUM</b> Seattle, Washington	<b>ST JOSEPH'S SANATORIUM</b> El Paso, Texas
<b>MARYKNOLL SANATORIUM</b> Monrovia, California	<b>SOUTHWESTERN PRESBYTERIAN SANATORIUM</b> Albuquerque, New Mexico
<b>PALMER SANATORIUM</b> Springfield, Illinois	<b>THE SAMUEL &amp; NETTIE BOWNE HOSPITAL</b> Poughkeepsie, New York
<b>PORTLAND OPEN AIR SANATORIUM</b> Milwaukee, Oregon	<b>THE SWEDISH NATIONAL SANATORIUM</b> Englewood (Denver) Colorado Modern Equipment—Moderate Prices
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# DISEASES of the CHEST

## OFFICIAL JOURNAL OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS

EDITORIAL OFFICE  
111 Millard Hall  
University of Minnesota  
Minneapolis 14 Minnesota

EXECUTIVE OFFICE  
500 North Dearborn Street  
Chicago 10 Illinois

**DISEASES OF THE CHEST** is published bi-monthly by the American College of Chest Physicians. The contents of the journal consist of contributions in the field of diseases of the chest, book reviews, editorials, case reports, news items and matters concerning the affairs of the American College of Chest Physicians and its affiliated societies.

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**BIBLIOGRAPHIES** Prepare carefully and fully to avoid confusion. Include in each reference (1) Number, (2) Author's last name followed by initials, (3) Title of article, (4) Name of periodical or book, (5) Volume, page and year if a periodical OR publisher if a book viz: I. Clerf L. H. "Tuberculous Tracheobronchitis" *Dis of Chest*, VIII 11, 1942.

Place list of references at end of article, not in footnotes. Arrange in numerical order.

A brief summary should be included for translation into Spanish.

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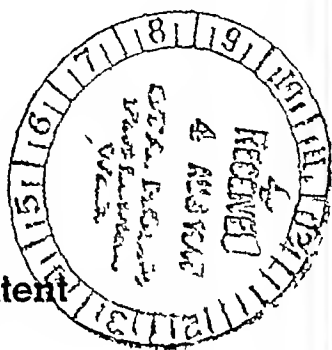
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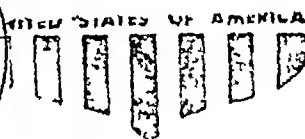
# DISEASES

of the

# CHEST



OFFICIAL PUBLICATION



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MAY - JUNE

1947

AMERICAN COLLEGE OF CHEST PHYSICIANS

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THIRTEENTH ANNUAL MEETING — AMERICAN COLLEGE OF CHEST PHYSICIANS

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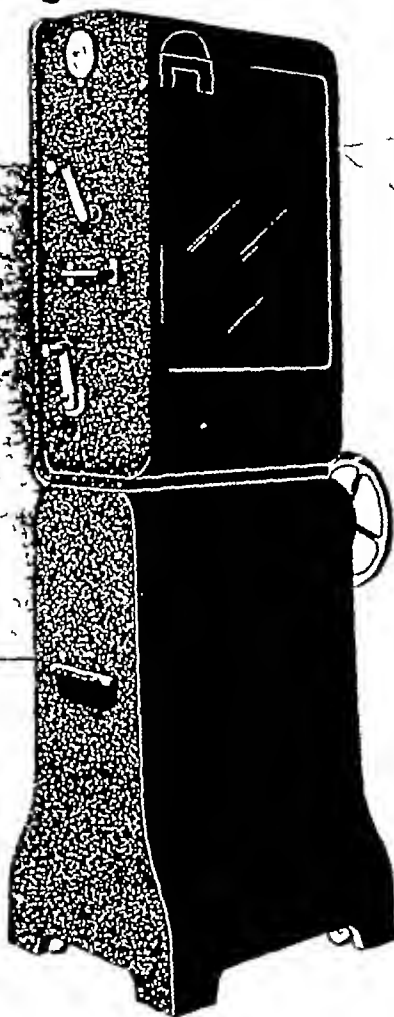
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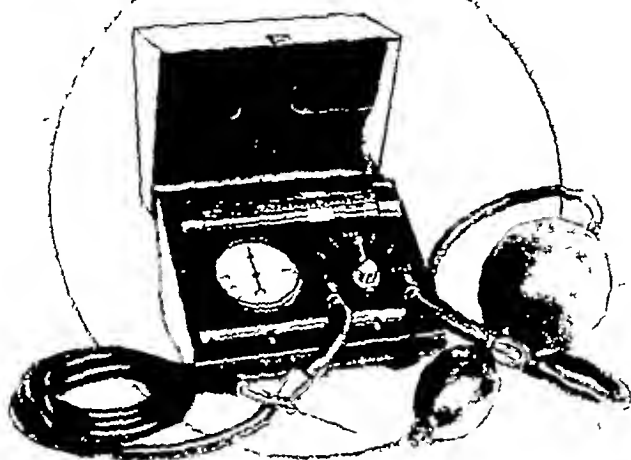
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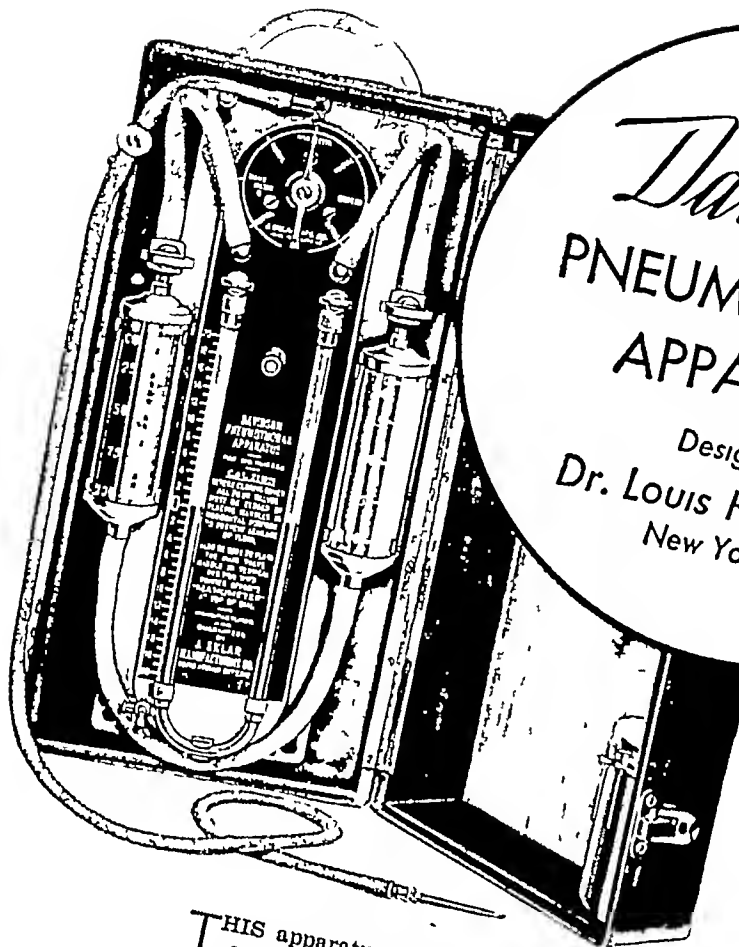
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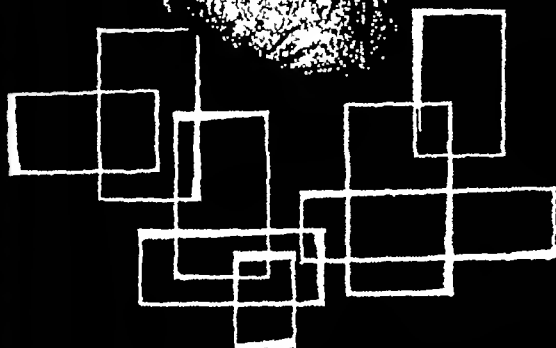
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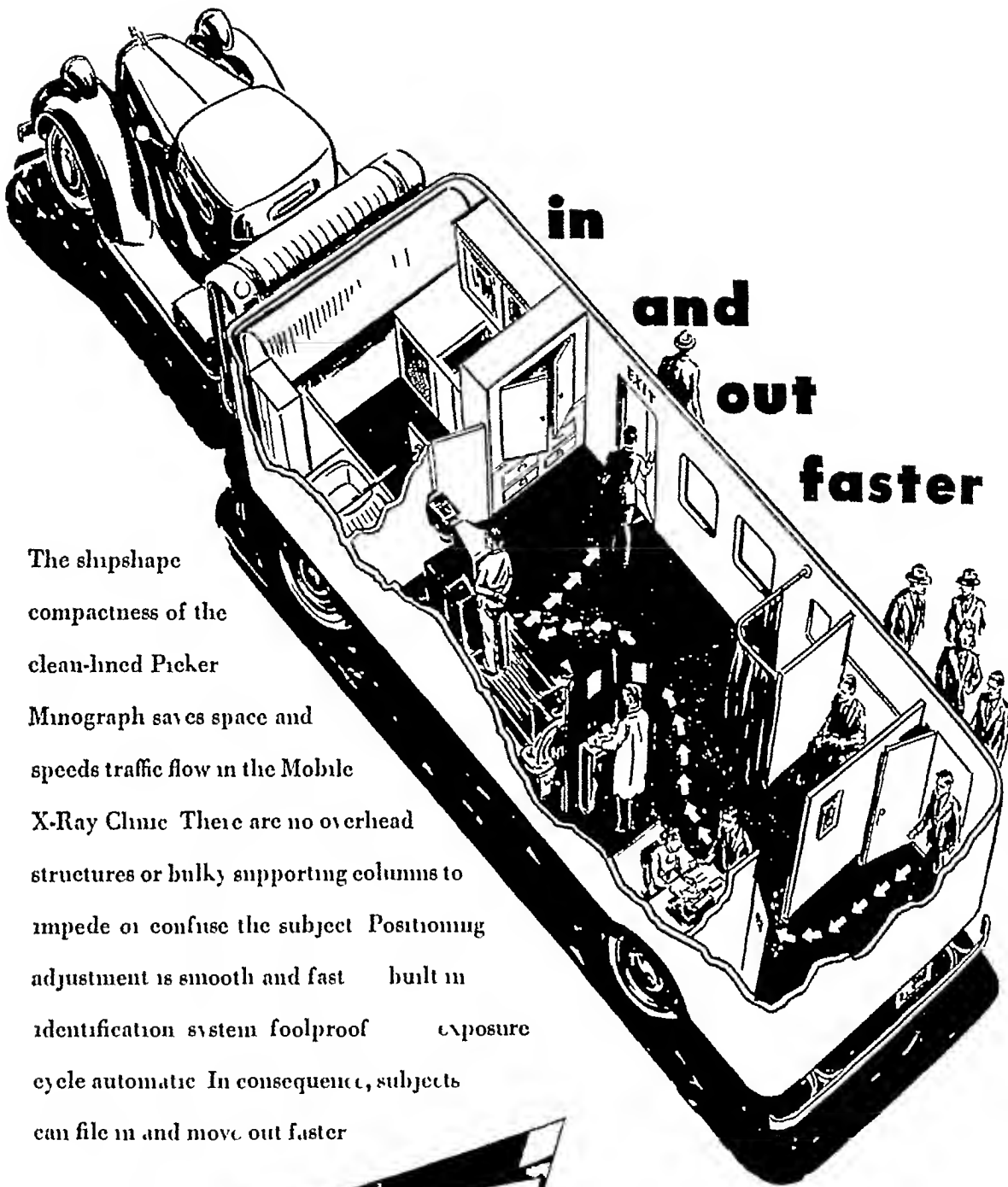
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# DISEASES *of the* CHEST

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VOLUME XIII

MAY-JUNE 1947

NUMBER 3

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## The Tuberculous Veteran, Plans for His Future Care\*

ROY A WOLFORD, M.D., F.C.C.P.\*\*  
*Washington, D C*

In the first World War, excluding battle injuries, tuberculosis was the second leading cause of discharge for disability of officers and enlisted men of the Army during the period April 1917 to December 1919, inclusive Tuberculosis accounted for 22,390, or over 12 per cent of the 178,699 discharges for disability recorded

The accredited number of persons in military service during World War I, was 4,757,240 By June 30, 1922, less than four years after active hostilities had ceased, compensation for service-connected tuberculosis had been granted to almost one of every 130 individuals, or a total of 36,600 living veterans who had served in that conflict The number of cases on the compensation rolls whose major disability was tuberculosis, increased to a peak of 63,932 by the year 1933

On January 1, 1946, there were still almost 60,000 disability cases from the earlier conflict on the compensation and pension rolls for tuberculosis, of which about 50,175 were service-connected and over 9,775 were suffering with a total permanent disability not attributed to service

Roughly, in a period of a quarter of a century, 2½ per cent of the individuals alive or deceased who served in the first World War were known to have contracted tuberculosis of a compensable degree

There are still 15 per cent of the total World War I compensation service-connected disability awards being paid for tuberculosis as the major disability

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\*Published with permission of the Chief Medical Director, Veterans Administration, who assumed no responsibility for the opinions expressed or conclusions drawn by the author Presented at the Twelfth Annual Meeting, American College of Chest Physicians, San Francisco California, June 30, 1946

\*\*Assistant Director, Tuberculosis Service, Veterans Administration

What is the comparable picture presented in tuberculosis among veterans of World War II? For the present, that picture cannot be etched too clearly, but it can be stated that on the first anniversary of V E Day, only a little more than one and one-half per cent of the disability pension cases of veterans who served in the Army, Navy, Marine Corps or Coast Guard on or after December 7, 1941, were for tuberculosis. This is a heartening circumstance.

From the data currently available, although the period of World War II was three times as long and the eventual number of individuals who served in the military service during World War II will be as much as four times that accredited to the first World War, the tuberculosis case load of the Veterans Administration should prove to be not much greater than that experienced after the first world conflict. The 150,000 tuberculous individuals who have been prevented, according to Colonel Esmond R Long, from entering the armed forces by the use of the chest x-ray in the pre-induction examinations will weigh heavily in supporting an estimate that, of the total of all pension cases on the Federal rolls after World War II, the percentage for tuberculosis will be smaller than after World War I, perhaps not more than two per cent of the whole.

The number of tuberculous veterans treated at Federal expense in hospitals after the last war did not exactly parallel the trend that was manifest in the yearly total of disability cases for tuberculosis on the compensation rolls.

The most active year in the experience of the Veterans Administration, insofar as hospital admissions and discharges of tuberculous beneficiaries are concerned, was the fiscal year 1922, approximately three years after the Armistice of November 11, 1918.

From then on there was a steady decline in the number of tuberculous patients remaining in hospitals. By the end of 1923, the neuropsychiatric hospital load for veterans approximated and soon exceeded the number of tuberculous beneficiaries being treated in hospitals, but it was not until the year 1928 that the monthly total of general medical and surgical patients under hospital care had become greater than the number under treatment for tuberculosis. This change in the type of the hospital load among veterans was in good measure the result of successive statutory amendments to the basic compensation law. The presumption of service origin of neuropsychiatric and tuberculous disabilities which had developed to a ten per cent degree, was by law first authorized for two years after discharge, was lengthened later to three years, then in the Act of June 7, 1924, was finally authorized by the Congress for up to January 1, 1925 (or over six years after the Armistice of November 11 1918). The same Act extended benefits of hospitaliza-

tion to veterans suffering with non-service connected disabilities, including tuberculosis

The tuberculosis hospital load has now, again materially increased

In all hospitals, admissions for tuberculous veterans having service in the armed forces after December 7 1941, have approximated seven (7) per cent of the total admissions for all disabilities By February 28, 1946, more than 23,600 admissions of tuberculous World War II veterans had been made to our hospitals of which about 16,100 were admitted for the service-connected tuberculous disability The tuberculosis of more than 7,500 of these admissions was not service-connected

The Veterans Administration is now operating over 8,650 tuberculosis beds with 6,000 located in fourteen (14) tuberculosis hospitals and 2,650 in tuberculosis departments of fifteen (15) general hospitals In addition, there are 775 beds in twenty-two (22) neuropsychiatric hospitals for tuberculous psychotic male and female beneficiaries

The scope of the tuberculosis problem confronting the Veterans Administration is fully realized by all of us who are responsible for the future application of this program We recognize the practical task of dealing with it will require extensive facilities and constant intelligent effort There are five (5) fields of endeavor which must be adequately covered

- (a) Preventive through control of the infective pool and periodic chest x-ray surveys of all personnel
- (b) Early diagnosis to be implemented by chest x-ray studies of all veterans examined on an outpatient status or admitted to any type of hospital
- (c) Prompt and effective definitive treatment
- (d) The control of all relevant social factors
- (e) Rehabilitation and protection following treatment

Adequate control of the infective pool can be accomplished only through a sizeable increase in tuberculosis beds and the recruitment of personnel to man them By the middle of 1947, it is expected new construction will be completed at three (3) existing hospitals and on seven (7) new sites already selected which will result in an increase of approximately three thousand (3,000) beds By the acquisition of two (2) Army hospitals, eleven hundred (1100) additional tuberculosis beds will be obtained and later through the conversion of five (5) general hospitals to tuberculosis hospitals, nineteen hundred (1900) more beds will be secured Thus, exclusive of beds for tuberculous psychotic patients, there will be approximately fourteen thousand six hundred (14,600) tuberculosis beds available by January 1, 1948

Our future plans call for five (5) types of institutions for the hospital treatment and post-hospital care of tuberculous veterans. Briefly, they may be classified as follows

- 1 Units of approximately 150 beds each at over a score of our neuropsychiatric hospitals which will be equipped to render highly specialized care to tuberculous psychotic patients. Several of these units will be staffed as thoracic surgery centers for major collapse therapy in psychotic beneficiaries with tuberculosis.
- 2 Departments of not less than 100 beds in general hospitals for the treatment, near their families, of tuberculous patients who require constant bed rest.
- 3 Rural sanatoria for patients who are ambulant in any degree and who may be expected to improve with definitive treatment. Our present tuberculosis hospitals can be adapted for utilization as this type of sanatorium.
- 4 "Health resorts," with proper segregation from the nearby community, for ambulant patients with positive sputum for which definitive treatment is not effective or a therapeutic regimen of this nature has been declined by the patient.
- 5 Communities for ambulant patients who have negative sputum but who are handicapped by emphysema, other complications or a concomitant disease to an extent that does not permit them to engage in the regular rehabilitation program for the tuberculous.

Recruitment of many experts in tuberculosis, thoracic surgery and the allied specialties has been made possible through more attractive salaries, increased chances for professional advancement and the greater prestige that will come with better opportunities to practice medicine which has resulted from the establishment of the Department of Medicine and Surgery in the Veterans Administration in early January of 1946. A number of the new appointments to the Department of Medicine and Surgery, in the higher grades have been tendered certain of the better trained, older physicians with teaching experience, from various sections of the country, who are recognized leaders in the field of tuberculosis. These teachers, in conjunction with a recent broadening of the consultant services at several tuberculosis hospitals located near teaching medical centers and in collaboration with the medical schools in proximity, will permit us to establish adequate teaching facilities for residencies in tuberculosis and thoracic surgery and to train the younger physicians under nationally recognized leaders in medicine and thus interest the young medical graduates in tuberculosis and a career in the Veterans Administration.

To insure early diagnosis and the application of prompt treatment of tuberculosis among the younger veterans, chest x-rays of each hospitalized patient at time of admission and each out-patient at time of scheduled examination, regardless of the disability for

which hospitalized or examined, with periodic survey of all general and neuropsychiatric patients at the end of each twelve (1) months' residence in hospital, have been authorized. The chests of over a million veterans will thus be x-rayed annually. By this case-finding procedure alone many lives will be saved and untold days of invalidism will be spared the veterans of this war who contract tuberculosis.

To render effective definitive treatment, minimum standards for the examination and treatment of tuberculous beneficiaries have been promulgated and improved methods of reporting active cases of tuberculosis among veterans have been effected.

Liberalization of regulations to permit the early re-hospitalization of patients with positive sputum, who have previously left the hospital against the advice of the physician, has been made and regulatory measures to encourage continued hospitalization in cooperative patients in this classification have been amplified. These procedures serve a two-fold purpose, firstly, by providing for a relatively uninterrupted hospital treatment program for those patients who are compelled because of urgent economic or social reasons to leave the hospital for a short period of time while these difficulties are being personally adjusted and, secondly, by controlling, in part, the infective pool of communicable pulmonary tuberculosis in the veteran population.

Measures for frequent and thorough post-hospital follow-up care have been established. It is hoped through quarterly re-examination on an out-patient status, of all recently hospitalized tuberculous patients, to reduce the number whose disease becomes re-activated, to arrange a more happy and secure convalescence and to induce an earlier readjustment of the tuberculous veteran to his eventual place in the civilian economy.

Our social work staffs are being expanded as workers interested in tuberculosis become available. It is the eventual objective to have at least one social worker for every one hundred and twenty-five (125) tuberculous beneficiaries being cared for in the hospital. Through active liaison with voluntary and contract social work agencies in the patient's home community, it is hoped many of the social and economic factors which beset individuals hospitalized for a long period of time, can be alleviated.

In the present reconversion period, increased emphasis is being placed on early rehabilitation of the disabled individual regardless of whether his handicap has been contracted in the armed forces or in industry. Among our younger tuberculous veterans there is an insistent demand for diversional and pre-vocational activities that will be of some future use to the patient, or will prove of benefit to him in his educational program.



To meet this new interest educational instructors and rehabilitation directors are being placed on duty at our tuberculosis hospitals as qualified appointees are found Correspondence courses to supplement individual and group instruction in commercial and academic subjects by educational instructors have been authorized

It is our intention to develop the hospitalized veteran's sense of responsibility and interest by coordinated planning at the appropriate point with the patient relative to his health and occupational goal and through evaluation of the role which each specialty of therapy in the hospital and the patient himself may contribute to its accomplishment Under the leadership of the clinical director therapy conferences are convened at periodic intervals, attended by the ward physician the social worker, the rehabilitation director the occupational therapy aide, the librarian, and the recreational aide As promptly as feasible after the veteran's admission to the hospital his case history is thoroughly studied to determine the steps which each specialty will undertake in the readjustment of the patient's vocation

In collaboration with the National Tuberculosis Association, a demonstration unit was established at one of our tuberculosis hospitals through the employment of a full-time vocational counsellor who conducted aptitude tests and guidance interviews He assisted other members of the committee on rehabilitation for the hospital by authoritative reports on the future types of employment proposed by the patient or indicated by the results of his studies This has permitted us to form objective conclusions as to the adaptability of this type of service to the treatment of hospitalized tuberculous beneficiaries and we are, accordingly, expanding this service to other tuberculosis hospitals

For some years we have utilized beds in contract hospitals for female beneficiaries suffering with tuberculosis Until recently the Veterans Administration has been able to care for its male tuberculous beneficiaries in its own hospitals The established tuberculosis hospitals of the Veterans Administration are now filled to capacity Four hundred veterans whose tuberculous disability was not incurred in service are awaiting admission to our hospitals The Army and the Navy are retaining several thousand soldiers and sailors in the service hospitals under definitive treatment for tuberculosis until beds can be secured for them in Veterans Administration Hospitals or through contract beds in private municipal, county and State hospitals For the immediate future large blocks of contract beds for male and female tuberculous beneficiaries are required An intensive effort is being made through the Regional Offices to secure as many contract beds in non-Federal hospitals as possible Currently we have been able to ne-

gotiate contracts for a little over twelve hundred (1200) tuberculosis beds in sixty-eight (68) sanatoria. Unfortunately, hospitals under other than governmental control are beset with similar personnel shortages as are Federal hospitals so that the search for contract beds has not proved as fruitful as we had anticipated. It is hoped, as the release of physicians and nurses from the Army and the Navy continues, that many more private sanatoria and tax-supported municipal, county and State tuberculosis hospitals will see their way clear to enter into mutual advantageous contracts with the Veterans Administration to care for its tuberculous beneficiaries.

Those who are directing the tuberculosis program in the Veterans Administration hope, in the not too distant future, to assume some of the responsibility for research in tuberculosis and with that objective in mind administrative authorization for a research institute for tuberculosis has been secured.

The inauguration of a research project of this proportion must await the time when a staff of scientists qualified to undertake this work can be assembled.

### SUMMARY

Tuberculosis accounted for over 12 per cent of the discharges for disability of officers and enlisted men of the Army during a 33-month period in the first World War.

Of the total World War I compensation service-connected disability awards still being paid by the Veterans Administration, 15 per cent are for tuberculosis as the major disability.

Currently only 15 per cent of the disability compensation cases of veterans who served in World War II are receiving awards for tuberculosis.

The Veterans Administration is now operating over 8,650 tuberculosis beds. Contract beds in private, municipal, county and State hospitals are also being utilized.

Measures to insure early diagnosis, application of prompt effective definitive treatment, frequent and thorough post-hospital follow-up care have been established, medical, nursing and social work staffs have been expanded, and increased emphasis is being placed on early rehabilitation of the disabled tuberculous veterans.

Future plans call for five types of institutions for the hospital treatment and post-hospital care of tuberculous veterans.

- 1 Units of 150 beds each for specialized care of tuberculous-psychotic patients
- 2 Departments of not less than 100 beds in general hospitals for patients who require constant bed rest

- 3 Rural sanatoria for ambulant patients under definitive treatment
- 4 "Health resorts" with proper segregation for ambulant patients with positive sputum not under definitive treatment
- 5 Communities for ambulant patients with negative sputum handicapped by complications or a concomitant disease

### RESUMEN

Más del 12 por ciento de los oficiales y soldados del Ejército que fueron dados de baja por razón de invalidez, durante un período de 33 meses en la primera Guerra Mundial, sufrían de tuberculosis

Del total de indemnizaciones decretadas en la primera Guerra Mundial por incapacidad contraída en el servicio militar y que aun continua pagando la Administración de Veteranos, en el 15 por ciento la tuberculosis constituye la incapacidad principal

En la actualidad solamente el 15 por ciento de las indemnizaciones por incapacidad acordadas a los veteranos que participaron en la segunda Guerra Mundial lo fueron con motivo de la tuberculosis

Actualmente la Administración de Veteranos mantiene más de 8,650 camas para tuberculosos. También se utilizan camas contratadas en hospitales privados, municipales, de los Condados y de los Estados

Se han establecido medidas para asegurar el diagnóstico precoz, la rápida aplicación de un tratamiento eficaz definitivo y el cuidado posthospitalario frecuente y completo, se ha aumentado el numero de médicos, de enfermeras y de auxiliares sociales, y se le presta más atención a la pronta rehabilitación de los veteranos tuberculosos incapacitados

Hay además el propósito de establecer cinco tipos de instituciones para el tratamiento en hospitales y el cuidado posthospitalario de los veteranos tuberculosos, a saber

- 1 Unidades de 150 camas cada una para el cuidado especializado de los tuberculosos con enfermedades mentales
- 2 Departamentos de no menos de 100 camas en hospitales generales para pacientes que necesitan descanso en cama continuo
- 3 Sanatorios rurales para pacientes ambulantes bajo tratamiento definitivo
- 4 Colonias para enfermos, con separación adecuada para pacientes ambulantes con esputo positivo que no se encuentran bajo tratamiento definitivo
- 5 Colectividades para pacientes ambulantes con esputo negativo que sufren de impedimentos por motivo de complicaciones o de enfermedad concomitante

## Discussion\*

ARNOLD SHAMASKIN, M.D., F.C.C.P.\*\*

*Hines, Illinois*

Dr Wolford's excellent and comprehensive presentation illustrates the extent to which the Veterans Administration is planning to make available to the war veteran the facilities for treatment and rehabilitation which are consistent with the most advanced thoughts in the management of tuberculosis

A survey of patients admitted to the Tuberculosis Service of Hines Hospital during the early part of the war showed a vast predominance of minimal and moderately advanced cases. These cases were discovered, to a great extent, during the course of routine x-raying of various groups for one reason or another while the men were still in the armed forces. As the war progressed and came to an end, with the resulting acceleration of discharges from the armed forces, a gradually increasing percentage of far-advanced cases has been observed among our admissions. Many of these cases were discovered at home after the onset of symptoms.

It was shown by Dr Wolford that whenever a veteran is examined for any purpose whatsoever at a Veterans Administration station, a chest x-ray is made routinely. Thus there will be carried on a continuous tuberculosis survey of a considerable sector of our population. There remains, however, the bulk of war veterans whom the Veterans Administration cannot reach under the existing laws. These are the veterans who have no occasion to come within the sphere of the medical branch of the Veterans Administration. Local agencies will have to include this group of veterans in the mass roentgenographic surveys which are incorporated in the future plans for the control of tuberculosis.

A serious problem still remaining to be solved is how to retain the patient continuously hospitalized until treatment is completed. It should be emphasized, however, that this problem exists not only in Veterans Administration Hospitals but also in non-Federal institutions throughout the country. Tuberculosis Topics<sup>1</sup> reports that approximately thirty per cent of patients in all tuberculosis hospitals left against medical advice during the war years. Drolet<sup>2</sup> made a survey of tuberculosis patients discharged from 41 institutions in the New York Metropolitan area. He found that out of

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\*\*Chief, Tuberculosis Service, Veterans Administration Hospital

4,015 patients discharged during the first half of 1945, approximately 35 per cent left against medical advice. At the Hines Veterans Hospital, 32 per cent of all discharges from the Tuberculosis Service were against medical advice in 1945.

The study of the causes for irregular discharges from tuberculosis hospitals, and of the measures to be taken for their prevention, must therefore be as high on the agenda of every organization interested in the control of tuberculosis as it is in the Veterans Administration. Undoubtedly the reasons vary to a certain extent among different groups of patients and in different types of hospitals. A review of the table prepared by Drolet<sup>2</sup> shows an unusually high rate of discharges against medical advice among hospitals having the most modern buildings and equipment and known to be very well staffed and managed.

Canada is said to have developed a very effective method for the control of irregular discharges among veterans. I have had no opportunity to check on the details of this system, but apparently it consists of imposing a series of gradually increasing fines, beginning with two dollars for the first offense and going up to one hundred dollars for the fourth and subsequent offenses. A system like this has a great deal in its favor.

Among the plans for the future care of the tuberculous veteran, several measures such as the establishment of five different types of tuberculosis hospitals, for which credit must be given to Dr. John Barnwell, Director of the Tuberculosis Service of the Veterans Administration, also the follow-up system and above all, the rehabilitation program will no doubt favorably influence the continuity of treatment.

It was shown by Dr. Wolford that in the plans for the future care of the tuberculous veteran the strongest emphasis is being placed on early rehabilitation. The intelligent young person whose mental processes are not impaired by the toxemia of an acute febrile disease, or by severe bodily discomfort, finds it frequently very difficult to lead the vegetative life necessitated by the prolonged bed rest in the treatment of pulmonary tuberculosis. As imperative as complete physical and mental relaxation is, we must recognize the fact that the average young tuberculous patient is bound to be frequently disturbed by thoughts of the future. This, in turn, affects adversely the continuity of treatment. In order to prevent such a person from lapsing into a state of mental stagnation, and to provide for him an added incentive to remain in the hospital until treatment is completed, it is necessary to start his industrial rehabilitation as soon after admission as his physical condition permits. Expert guidance is as essential for one as for the other. To leave the rehabilitation to chance is as im-

practical and as unscientific as to leave the management of his medical treatment to his own devices

With this idea in mind, and in accord with the concept of the Veterans Administration, there was organized during the latter part of 1945, on the Tuberculosis Service of Hines Hospital, a rehabilitation team consisting of a trained vocational rehabilitation counselor, an academic instructor, the social worker, and the physician. Under this program, it will be possible for patients to obtain high school and college credits while still under hospital care. One of our patients was already awarded a high school diploma.

The Veterans Administration recognizes that the modern tuberculosis hospital is a great deal more than a place where only the disease is treated. It considers that a well-planned and well-executed program of rehabilitation, carefully integrated with the therapeutic regimen, designed to fit in with the post-hospital program of rehabilitation, is a vital function of the modern tuberculosis hospital. Treatment and rehabilitation are viewed by the Veterans Administration as parts of one continuous program for the purpose of fitting the tuberculous veteran back into the social fabric as a useful, self-supporting and self-respecting member of the community.

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- 1 "Tuberculosis Topics," *National Council of Jewish Tuberculosis Sanatoriums*, Denver, Colorado, 1945
- 2 Drolet, G. J. "Special Report," 1945, *New York Tuberculosis and Health Association*

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## Discussion

FORREST G. BELL, M.D., F.C.C.P.  
*San Francisco, California*

Having worked for many years in this field with Dr. Wolford, I feel considerably honored to be able to take part in a discussion of his presentation.

The most important therapeutic measure for the treatment of pulmonary tuberculosis is still that of rest. By rest we mean psychological rest as well as physical rest.

In order to relieve the patient from worry, fear and anxiety associated with personal, domestic or economic problems, the auxiliary medical agencies such as Social Service, Red Cross and

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\*Branch Medical Director, Branch 12, Veterans Administration

recreational facilities may be used to advantages in providing psychological rest for the individual patient

Another procedure of extreme importance in establishing psychological rest is that of proper orientation of each patient regarding his disease and the treatment program to be followed during his stay in the Veterans Administration Hospital. A brief concise orientation on the transmission, diagnosis and treatment of tuberculosis should be given each new veteran patient. The patient should understand that psychological and physical rest is the most important phase of the treatment program. A brief description of some of the surgical procedures should be presented so that a patient may obtain authentic information about such methods of treatment.

Finally, through the medical rehabilitation program, the patient should be offered hope for early recovery and early restoration to his social environment.

It should be pointed out that one of the chief aims of the medical rehabilitation program is to get the patient out of the hospital as soon as he is physically, psychologically and economically able to leave.

During the early stages of the treatment of tuberculosis the emphasis of medical rehabilitation is on education, including reading, recreation and vocational counseling. Pre-vocational training should be started as soon as possible. Plans should be made by the patient for the kind of training he wishes to receive while in the hospital as well as the kind of vocation he plans to follow when he leaves. While the patient is bedfast occupational therapy, educational films, lectures and recreation facilities are to be used to the fullest extent.

When the patient becomes ambulatory pre-vocational training is supplied by the retraining division. This program provides a wide variety of educational subjects and vocational training in the form of practical experience in hospital shops which are to be set up as a part of the medical rehabilitation program. Adequate vocational guidance will be provided early and continued advice and assistance is to be supplied throughout the course of treatment.

Another recent innovation in the medical rehabilitation field is the establishment of a rehabilitation board in each hospital. The chairman of the board is a medical officer. Other members are the psychiatrist, Chief Medical Officer or ward surgeon, social service worker, physical therapist, occupational therapist and any other personnel of the hospital staff considered desirable as a member of the board. The board will consider the overall picture of the treatment program for each patient and will make final

recommendations for the program to be followed in each individual case

It is believed that this approach to the treatment of tuberculosis will encourage active cooperation on the part of the patient in the treatment of his disease and it is hoped that a bigger percentage of arrest and a lower incidence of relapse will be accomplished

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# Tuberculosis Program in Grand Rapids, Michigan

J VINCENT SHERWOOD, M D \*

*Grand Rapids, Michigan*

The fight against tuberculosis has had many champions Many agencies have sponsored its cause Only when all those agencies can combine and co-ordinate will we have an efficient program

The fact that Grand Rapids had the distinction of having the lowest tuberculosis death rate among the 92 largest cities of the country (those over 100,000 population) is no mean accomplishment It is interesting to hear all the many explanations for this A few of those reasons given are

The large percentage of sturdy Dutch people,

The lack of slum areas,

The lack of large industries

The population is not entirely Holland Dutch<sup>1</sup> We have as many of Slavic and other backgrounds We have our share of basement apartments, dark rooms and dilapidated homes The percentage of small plants is a hazard and not a help Many of these small plants are metal working industries and they have no full time health department or program Many have a very scant pre-employment examination and the medical care is first aid for accidents

It is surprising that no one would suggest that the tuberculosis program as carried out might be the reason for Grand Rapids enviable position We have had our problems in tuberculosis, but Grand Rapids has been fortunate in having certain personalities pushing the tuberculosis program in the community I feel free to say this inasmuch as I have had nothing to do with that program up to the 1944 period in which the low death rate of 15.8 was obtained

It would be interesting to outline the program as carried out in the community and then point out certain places that coincide with marked changes in the death rate as shown on the accompanying graph

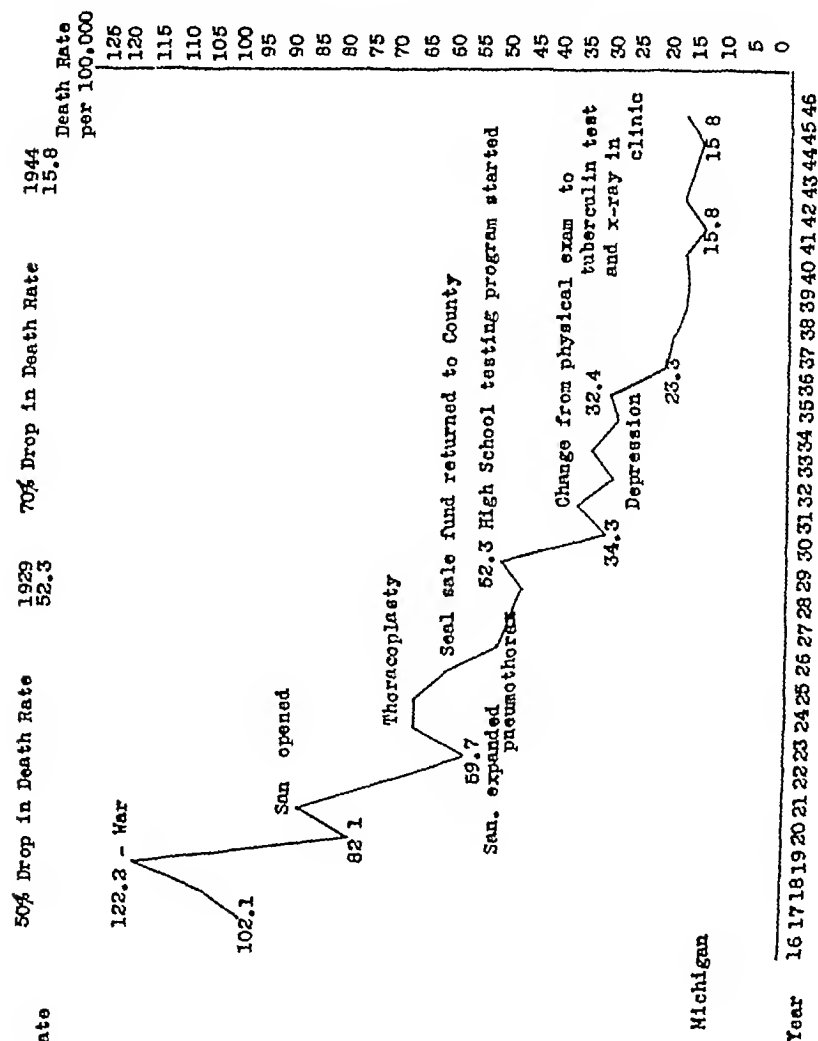
The tuberculosis control program in the Grand Rapids area is divided among several groups, official and volunteer, so that interest is widely spread This is important for any problem which requires so much education Health Officers cannot use their power nor sanatorium specialists treat their patients until they are found Cases will not be discovered unless everybody knows what causes

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\*Superintendent and Medical Director, Sunshine Sanatorium, Grand Rapids, Michigan

tuberculosis and how it acts—unless they know that tuberculosis may be carried by people without evidence of symptoms and that it can more easily be cured if found and treated early Lay people working with professionals learn more than they do by merely hearing or reading the facts Our various media of control, all available at public expense, include

- |                        |                  |
|------------------------|------------------|
| 1 Education            | 4 Treatment      |
| 2 Case finding         | 5 Follow-up      |
| 3 Checking of contacts | 6 Rehabilitation |



1 *Education* should be the keystone of any tuberculosis campaign and, if education is carried out, with services rendered, it becomes doubly effective. While the responsibility for the control of tuberculosis belongs to the government (through our health departments), in a democracy that means the people. A wise Health Officer recognizes that, and utilizes every ounce of interest and every dollar a group of volunteers can bring to bear on this problem. Grand Rapids' tax supported services have been handicapped by a 15 mill tax limitation on property. Health departments, both city and county, have had to work on limited budgets.

Our formal educational program is conducted chiefly by the Grand Rapids Anti-Tuberculosis Society through lectures, motion pictures, pamphlets and posters (especially in schools and industries), through institutes, exhibits and the news columns. The Grand Rapids Anti-Tuberculosis Society has a very well informed, ambitious and energetic Secretary \* She had training in the tuberculosis program for eight years before taking over the Executive Secretary office. Some time was taken out of those eight years for Army service. After the first World War (1923) the executive position was taken by the present secretary, Blanche deKoning.

No matter how much knowledge one has of tuberculosis and its program, nothing can be accomplished unless that information is put to work. The Grand Rapids Anti-Tuberculosis Society has put first things first and has not been swayed by any political implications the program might present. A great deal of credit for any success Grand Rapids has in its program must be given to this Society and its leadership. In 1929 the Society started a tuberculin testing program in high schools and colleges which was the first in the state. It was soon discovered that such a project should be preceded by tuberculosis educational work among the faculty, students and Parent-Teacher Association. Time has shown that a tuberculin reaction provides a golden opportunity to educate the reactor and his family about tuberculosis. Thus early in the campaign an intensive follow-up program was initiated with two or three well informed nurses calling in the homes of all reactors. Some adult carriers were found and hospitalized. This plan of education and service later spread throughout Michigan with telling results.

The work in the schools proved so effective that it has been extended to the industries of the county. First an educational program is instituted among employers and employees through bulletins, posters, and distribution of literature. This has resulted in excellent cooperation, in fact, in most plants the response for

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\*Mrs. Blanche deKoning, Executive Secretary, Grand Rapids Anti-Tuberculosis Society

examinations has been from 95 to 100 per cent Both the tuberculin test and x-ray inspection of the chest are used as screens A mobile x-ray unit is taken to the plants and each employee receives a tuberculin test when he comes to the bus for his photo-fluorogram Within the next 72 hours a nurse from the tuberculosis society goes to the desks and machines of the workers to inspect the tests, thus conserving their time All who present x-ray shadows are examined to determine the etiology of the disease The goal is accuracy in diagnosis and proper disposition of cases of tuberculosis rather than speed Sight is not lost of the educational opportunity through follow-up work on the tuberculin reactors

It is claimed that the decline of tuberculosis in the United States has been accelerated by our high standard of living It should help greatly to have interest aroused through tuberculin tests, and through teaching reactors what is meant by good nutrition, decent housing and sufficient rest Our Anti-Tuberculosis Society follow-up nurses do just that

*2 Case Finding and the Free Tuberculosis Clinic* This clinic, located in the City Hall, is under the control of the City Health Department but supported partly by County funds Clinics are held three times a week The central location makes the clinic easily accessible and they are as free as our public schools While schools defend us from ignorance, such a clinical service defends us from disease Although the high school and industrial programs seek cases through the survey method among apparently well people, all suspicious cases are sent to the tuberculosis clinic for final disposition Contacts of known cases and people with symptoms attend this health center regularly Discharged sanatorium patients use it for follow-up examinations About 3,500 examinations are made here annually by doctors of the sanatorium staff Nursing services in the clinic are by nurses from the Bureau of Public Health Nursing Follow-up is by this group for City cases and by the Kent County Health Department in the suburbs and rural areas We feel that by this follow-up, many breakdowns are prevented

In the conduct of the tuberculosis clinic, personalities again enter into the picture The Director of the Grand Rapids Bureau of Public Health Nursing\* was with the local Anti-Tuberculosis Society for nine years where she became well acquainted with the problems of the tuberculous individual Her interest in such persons makes for excellent co-operation in the tuberculosis program

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\*Mrs Mary Otterbein, Supervisor, Bureau of Public Health Nursing, City of Grand Rapids

The Grand Rapids tuberculosis program is fortunate in having Mrs Otterbein in her present position

Hours are distributed around the day so that most everyone may visit the clinic without too much disruption of his daily routine Anyone may come to the clinic without appointment and no one is turned away if he comes within the clinic hours

One of the large factors in the success of this program is the cooperation of all groups involved The medical men willingly and anxiously refer patients to the tuberculosis clinic which is set up to follow through a case—a task which is long and tedious at times A report and any recommendations that the clinic doctor may make is always sent to the physician who refers the patient A case may call for frequent filming, gastric lavage with culture and guinea pig inoculation, blood study or any other laboratory procedure helpful in differential diagnosis All laboratory work is done by the Western branch of the Michigan State Laboratory Drs Kendrick and Eldering and an excellent staff of about 30 handle all tests accurately and swiftly This facility plays no small part in the success of our program

The Clinic maintains a full time secretary All cases admitted are checked back to see if their record is in the active or discharged file Many times a record is present when the clinic patient did not even know it Some of these records are from childhood and of open air school days The address is checked A full history is taken of new patients At subsequent visits, temperature, pulse and weight are recorded The doctor at the clinic takes a brief clinical history and if a tuberculin reaction has been obtained before, an x-ray film of the chest is ordered The patient is sent to the sanatorium where a chest roentgenogram is taken and interpreted and a report sent back to the clinic The patient returns to the clinic for his report, and any recommendations deemed necessary If the chest x-ray film is satisfactory, the patient is requested to return in one year If he does not return, a nurse from the Public Health Nursing Bureau visits him and sees that he reports If the patient is to return within six months, a dated appointment slip is given him

If no tuberculin test had been done previously or if we are in doubt as to the outcome of any previous one, we do a Mantoux test first with 0.1 mg OT and then if that is negative, 1 mg is used This requires 3 visits by a great many, but very few objections are made We do not wish to give up the tuberculin test as we feel it is a diagnostic aid and also an educational procedure

As much time is given to any patient as is necessary Many require 10 to 15 minutes, but 1 or 2 minutes suffices for most cases No other chest examination is conducted since tuberculin testing,

sputum testing and x-ray inspection give the information desired

Bedside service is provided by the Community Health Service (our visiting nurses) for those who, for some reason or other, have remained in their homes. Because of recent nurse and help shortages in the sanatorium, this problem has been increased. This group uses its key position in many homes to spot suspects and refer them to their physicians or the clinic. A state law allows a court order to be filed to keep an active case isolated in a sanatorium. Occasional use is made of this law.

3 *Contacts* These are checked in two ways. Those contacts of the clinic patients are checked by nurses from our respective Health Departments. In the school program of the tuberculosis society the procedure is reversed. Here the nurse starts with the infected student and tries to find the source of infection.

4 *Treatment and Sunshine Sanatorium* The Kent County Tuberculosis Sanatorium (Sunshine Sanatorium) conducts the therapy program for the cases found in the community. The first case admitted to the Sanatorium (a tent) was in 1916. The death rate for Grand Rapids that year was 102.1 per 100,000 population. There was one death in the Sanatorium that year and 130 outside. In 1920 an established Sanatorium was opened. That year there were 55 admissions and 14 deaths. There were 105 deaths outside the Sanatorium. In 1923 the present buildings were opened when 131 cases were admitted to the Sanatorium. There were 29 deaths in the Sanatorium and 73 elsewhere in the city. In 1929 there were 170 admissions to the Sanatorium and 37 deaths, 51 persons died outside the Sanatorium. In 1930 there were 158 admissions and 36 deaths. Only 22 deaths occurred outside the Sanatorium. Increased percentage of deaths in Sanatorium is contagion control. In 1944, the year of the low death rate, there were 115 Sanatorium admissions and 19 deaths in the Sanatorium. Only 7 persons died outside of the Sanatorium. These years were picked out because of certain happenings in the program (Table 1). Each year a greater percentage of the deaths from tuberculosis took place in the Sanatorium.

This indicates that the people are using the Sanatorium to better advantage. Was that because the doctors of the community recognized the Sanatorium as a place for tuberculosis? Or was it because the clinic and the tuberculosis program were working more efficiently? Or was it because of the educational program of the Anti-Tuberculosis Society? The tuberculosis death rate is falling in all of Michigan. In the lower peninsula it is lower than in the rest of the State. Table 2 shows the comparison between Grand Rapids death rate and the rest of lower Michigan.

It is interesting to note that the percentage of admissions to

the Sanatorium of far advanced or minimal cases has not varied appreciably over the past ten years regardless of all the emphasis put on early diagnosis. Neither has the percentage of discharges as deaths and apparently arrested changed appreciably since 1937. However many cases of minimal tuberculosis have been watched outside the Sanatorium through the clinic. In Grand Rapids the chief function of the Sanatorium has been to isolate active cases. In Michigan, the University groups have been active in the tuberculosis program. Many of the recommendations for treatment in the local Sanatorium have been under their supervision.

5 *Follow-up* of actual cases and their families is also handled by nurses from the Health Departments. The nurses from the Bureau of Public Health Nursing attempt to find all contacts of any new active case that is found. These contacts are urged to come to the clinic. A subsequent visit is made to the home every six months to check on any changes in the health of the contact. When an open case is left in the home, a nurse visits and in-

TABLE 2

Year	Tuberculosis Deaths in Grand Rapids	Tuberculosis Deaths in Sanatorium	Death Rate Grand Rapids	Death Rate for Lower Michigan, Less Wayne County (Detroit)	Death Rate for All of Michigan
1916	131	1	102.1		
1917	146	0	109.9		
1918	162	2	122.2		
1919	111	3	82.1		
1920	124	19	90.1		
1921	106	19	75.0		
1922	86	17	59.7		
1923	102	29	69.8		
1924	101	31	68.1		
1925	98	39	63.8		
1926	83	41	53.2		
1927	84	41	51.9		
1928	80	44	48.7		
1929	88	37	52.3		
1930	58	36	34.3		
1931	66	44	38.4		
1932	57	32	32.7		
1933	64	32	36.2		
1934	56	22	31.7		
1935	57	31	32.4		
1936	41	31	23.3	27.31	41.34
1937	38	29	21.6	26.96	41.61
1938	35	30	19.9	23.90	36.59
1939	33	25	18.8	22.60	36.88
1940	31	26	18.9	20.78	33.33
1941	26	25	15.8	26.64	31.69
1942	31	18	18.9	19.36	33.51
1943	29	26	17.7	20.53	32.51
1944	26	19	15.8	18.32	32.51
1945	32	24	19.5	19.17	32.35

structs in isolation technique. Definite instruction is given as to patient and family routine. The policy of the Tuberculosis Society in its survey program provides for at least one subsequent x-ray inspection within two years for all tuberculin reactors. Would they really do a better job of prevention if these reactors were followed over a longer period? At least more cases would be discovered before they become infectious, which is now a big problem among sanatorium admissions. Most of them have already sown the seeds for more tuberculosis before they were discovered and isolated.

6 *Rehabilitation* has depended upon a local office of our State Department of Vocational Rehabilitation. Social problems are being referred to the local Family Service Association. However, the community recognizes the need for occupational therapy and a complete rehabilitation program in the sanatorium, and funds have been provided for this. A suitable professional worker is being sought.

The Kent County Medical Society and local Parent-Teacher Associations play important roles in this program. The medical group has worked with us through the Medical Committee of the Tuberculosis Society and Tuberculosis Committee of the Medical Society. The Parent-Teacher workers have folded Christmas Seals and prepared 50,000 letters for mailing during the seal campaigns since 1927. They have taken this as an annual obligation besides cooperating in the conduct of health institutes each year.

*Future Program*. We can never be satisfied with what has gone before. Constant planning for the future is needed. The easiest part of the program is behind us. To further reduce the death rate will require a more vigorous uncover program to find those chronic cases without symptoms who keep tuberculosis alive in a community.

It behooves us to have adequate facilities for care of this type of case. We must plan for sheltered and isolated work for these cases. They should not be locked up with nothing to do. Many of these cases can produce wealth if given the opportunity.

We must strive to make the recovered tuberculous self-supporting when possible. This part of the work is the least efficient in all tuberculosis programs. Industry must be brought into this project. The recovered tuberculous has learned how to take care of himself. He makes a good employee. He has less lay-offs and is usually steadier in his employment than the average worker. Should not tuberculosis be considered a compensable disease?

### SUMMARY

If death rates prove anything, it may be interesting to note that our rate declined from 103 per 100,000 population in 1905, when



the tuberculosis society was organized, to 52.3 in 1929. This shows a 50 per cent decrease in 24 years. From 52.3 in 1929 it dropped to 15.8 in 1944, a startling decrease of 70 per cent in only 15 years.

These things have been factors in this picture.

In 1923, our new Sunshine Sanatorium was opened. Modern approved tuberculosis treatment began at this time. The first pneumothorax was given in 1921 and thoracoplasties started about the same time.

In 1925, proceeds from our Annual Sale of Christmas Seals was returned to this county and education was greatly stimulated.

In 1929, tuberculin tests and x-ray examinations were started in our high schools and colleges and opened many doors for educational and preventive services.

Our free clinics were operated all during the depression years and at no time did the County Medical Society or any other organization exert pressure to have them closed.

### RESUMEN

Si los coeficientes de mortalidad sirven para algo, será de interés anotar que nuestro coeficiente bajó de 103 por 100,000 habitantes en 1905, cuando se organizó la Sociedad de Tuberculosis, a 52.3 en 1929. Esto demuestra una disminución del 50 por ciento en 24 años. De 52.3 en 1929, el coeficiente bajó a 15.8 en 1944, una disminución asombrosa del 70 por ciento en sólo 15 años.

Los siguientes factores han contribuido a que se obtengan estos resultados.

En 1923 se inauguró nuestro nuevo Sanatorio Sunshine. Se comenzó entonces el tratamiento moderno de la tuberculosis. Se aplicó el primer neumotórax en 1921 y se comenzaron a hacer toracoplastias más o menos al mismo tiempo.

En 1925 el producto de nuestra Venta Anual de Sellos de Navidad fue reintegrado a este Condado y se pudo así estimular mucho la instrucción pública en relación con esta enfermedad.

En 1929 se iniciaron las pruebas tuberculinicas y los exámenes radiográficos en nuestras escuelas secundarias y universidades y esto le abrió las puertas a los servicios educativos y preventivos correspondientes.

Nuestras clinicas gratuitas funcionaron durante todos los años de la depresión económica, y ni la Sociedad Médica del Condado ni ninguna otra organización influyó nunca para cerrarlas.

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All the information for this paper was obtained from Mrs. deKoning and Mrs. Otterbein and I wish to give credit to them and to those of the Sanatorium staff who have helped to collect statistics to be included above. Without their help the information could not have been assembled.

# Penicillin in Acute Suppurations of the Lung

DONATO G. ALARCON, M.D., F.C.C.P.

*Mexico City, Mexico*

Acute suppurations of the lung have been always one of the hardest problems which the specialist is called to confront due to the peculiar circumstances of the condition

Drainage of the abscesses through the bronchus, when its patency is maintained, has been the hope for a spontaneous healing in all cases and in this expectancy, several weeks and months usually elapsed thus delaying surgical intervention which is always feared as very hazardous

The use of some measures such as postural drainage, intravenous injections of several substances as sodium borzoate, ethyl alcohol, creosote derivatives, vaccination, arsenical compounds, etc., were considered justified until recently and a number of healings were attributed to every one of the procedures tried, although most of these measures could not resist the test of a critical study. Most probably the good results of some drugs should be credited to spontaneous healing through bronchial drainage

When the group of sulfa drugs appeared, renewed hopes led to the trial of these drugs in pulmonary abscesses and after some experience was gathered the consensus of the specialists was not entirely favorable and the surgical approach, which calls for the artificial drainage of every purulent collection, held its position. Therefore, a large number of suppurations were surgically treated once reasonable time had been given to test the effectiveness of the sulfa drugs

With the advent of penicillin, again all of us started trying the new drug for these suppurations, with the hope of avoiding surgical treatment and its risks. The early experience with penicillin, however, was not very satisfactory, for those who reported the first results from the use of the drug according to the pattern employed for other diseases

Again, the principle of draining any collections of pus was holding its position and most of the early observers advised not to delay the operation. Particularly, there were reported failures when dealing with abscesses caused by anaerobic germs of the fetid type. Little hope was left for the use of penicillin in this

group of suppurations in which nevertheless no one failed to employ penicillin, more or less skeptically

This condensed communication deals with the shortest description of a small series of lung abscesses treated with penicillin since this drug has been available. It is noteworthy at once that the number of cases coming to the specialist since the advent of penicillin is much less numerous than used to be, and this seems to indicate that the popular use of the drug has diminished the incidence of pulmonary suppurations in a very large degree.

The other point which I intend to stress is that since penicillin has been available, very few acute lung abscesses have reached the surgical stage, as most of them resolve before surgery is imperative. I may state that among the last ten cases seen by the writer in the last two years, only one was operated on account of pleural complication of the abscess and none has undergone the usual thoracotomy. This situation is strikingly different from that of a few years ago, when about fifty per cent of the lung abscesses needed surgical treatment, around the second month.

Due to the short time allotted to this presentation, I will make a brief description of eight cases. At the end, I shall try to draw some suggestions for the treatment of these suppurations from this experience which being limited as yet, force us to adopt a different attitude toward these conditions, than we did years ago.

### CASE REPORTS

The first case is that of a boy who developed a lung abscess and pneumococcus empyema in April 1944, and was seen as illustrated in Figure 1. The blood picture was characteristic: Leucocytes 23,300, neutrophils 82 per cent, typical fever, sputum pneumococcus and no tubercle bacilli.

He was treated with sulfapyridine and sulfamerazine but did not improve and before I saw him, 900,000 units of penicillin were given intramuscularly during a week. Then, I suggested the use of local instillation of penicillin into the cavity through the bronchoscope. It was done and spectacular success was obtained immediately. The fever subsided at once, the leucocytes diminished in number in less than a week and the cavity decreased as is seen in Figures 2, 3 and 4.

In this case we did not doubt that the success was due to the bronchoscopic use of penicillin although we did not give the procedure full credit because it was the first one.

The second case was that of a lady, 45 years of age, suffering from a definite suppuration of the lung of the fetid type. The sputum was abundant and very foul, the condition very critical, leucocytes over 20,000, and the x-ray film showed a large cavity (Figure 5).

The patient demanded very eagerly to be operated on, because she was coughing continually. Penicillin had been used by her doctor in rather large amounts intramuscularly, for over a week, and no signs of improvement were noticed. Rather, she seemed to become worse every day. However, I suggested the bronchoscopic application of penicillin, though I

remained ready to operate in the next days. The improvement was extremely gratifying. In a few weeks she became well, as can be seen in Figures 6 and 7.

The third case is that of a man of 35 who was under treatment on account of some erroneous diagnosis of typhoid fever and later discovered to suffer from empyema (Figure 8). Pneumococcus, streptococcus and fuso-spirochetal organisms were found in the pus of the empyema. A catheter was introduced without allowing air to enter, then the pleural cavity was washed and penicillin was left in the pleural space at short intervals. Also penicillin was used intramuscularly. When he improved



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2



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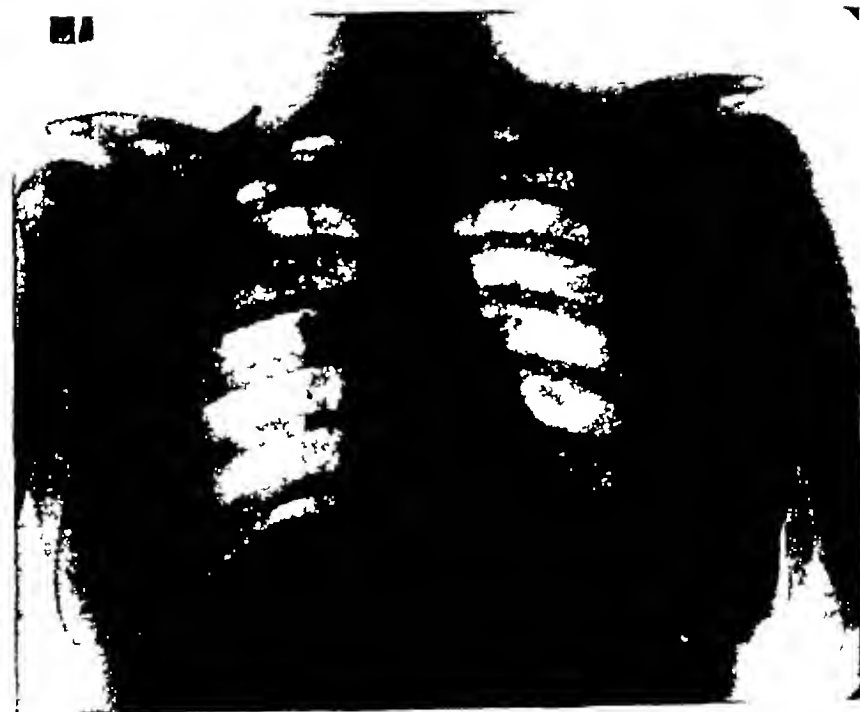
and became ambulatory and penicillin was discontinued, he developed a lung abscess, as may be seen in Figure 9 The condition became very serious Bronchoscopy was done and penicillin instilled into the right bronchus, and an immediate improvement was seen A few instillations



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6



7

into the trachea after the bronchoscopy were done and he recovered completely (Figure 10)

The fourth case is of a man, aged 46 years, who had some respiratory condition seemingly benign at first but his physicians became alarmed when he developed dyspnoea and had foul expectoration. The x-ray film showed a round infiltration, and although the condition was admittedly serious, was treated with sulfadiazine (Figure 11). In a few days he became rapidly worse and suddenly developed severe dyspnoea, cyanosis, high temperature and tachycardia. Then a new film was taken and a pyopneumothorax was diagnosed. The pus obtained by tapping was very



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9



10



11

fetid, and contained staphylococcus, streptococcus, fuso-spirochetal organisms and several other germs not identified (Figures 12 and 13)

The patient was operated upon in a very critical condition, a pleurotomy was performed, leaving a couple of tubes high on the back because the lung was adherent at the lower lobe. The film shows the approach and the result of the drainage (Figure 14)

Before the operation, the patient had several vomicas and during the operation, the opening of the bronchus into the pleura was confirmed. Through the tubes, penicillin was injected three times a day and a striking improvement was seen. In about ten days, the closing of the bronchial fistula was noticed and large washings of the pleural cavity



12



13



14



15

were feasible, leaving at the end of the washings some penicillin solution. After about 40 days, he left the hospital and has been well for over a year thereafter.

The fifth case, that of a man of 75 years of age, is worthy of description. He was at a hospital, unconscious for a week, under treatment with penicillin in regular doses, and with the diagnosis of lung abscess already established. Figure 15 shows the Roentgen ray aspects. Bronchoscopy was suggested with leaving penicillin in the cavity, if possible. This was done twice without discontinuing the intramuscular injections. Within a week he recovered consciousness and improved in an unex-



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17



18



19



pected way He became completely well in 40 days and resumed his normal life (Figure 16)

Three more cases can be summarized as follows

One is that of a man 65 years old, with a definite suppuration of the lung clinically, bacteriologically and roentgenologically

Figure 17 shows his condition He improved under the treatment described but relapsed soon to improve twice more under the same treatment On account of this circumstance, carcinoma of the lung was suspected and puncture-biopsy done which confirmed the diagnosis He died after a pulmonary hemorrhage (Figures 18 and 19)



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22



23

The seventh case is one of lung abscess following a duodenal operation. He was under penicillin treatment given intramuscularly, one million units already having been administered. I advised to proceed with treatment outlined above and he healed completely after four weeks (Figures 20 and 21).

The last case is one of acute suppuration with atelectasis, leucocytosis of 19,000, fever, anemia and other toxic and local symptoms. Another specialist did bronchoscopy and diagnosed carcinoma, although the biopsy was negative (Figure 22). Treated with penicillin for over one month. The shadows seen on the first film disappeared and the patient recovered completely (Figure 23).

From this short series of cases we shall try to draw some suggestions concerning the treatment of pulmonary suppurations by means of penicillin.

- 1 The use of penicillin should be continued for as long as necessary to obtain a definite improvement clinically as well as hematologically. This protracted use of penicillin must go beyond the average for other acute diseases before it is considered a failure.

- 2 The improvement as ascertained by Roentgen rays is much less rapid than the clinical and hematological ones. Under penicillin treatment the cavities become sterile, we believe, before they close, as far as the combined clinical, hematological and x-ray films can show.

- 3 When an immediate response to the intramuscular penicillin is not seen, the use of the bronchoscopic approach to the purulent focus is imperative.

- 4 In these cases, as described, credit should not be given to bronchoscopy alone but to the combined use of penicillin intramuscularly and bronchoscopically. Earlier experience with the bronchoscope alone failed to give as good results as the combination of these two methods.

## RESUMEN

La evacuación del contenido de los abscesos pulmonares ha sido el mecanismo natural que tiende hacia la curación del proceso supurante. Esta evacuación espontánea y constante a través de un bronquio permeable no es sin embargo el hecho corriente en la evolución de los abscesos pulmonares y el esperar que la canalización espontánea conduzca a la curación es a menudo peligroso.

El empleo de medios médicos como las drogas diversas, vacunación, o de medios mecánicos auxiliares como la canalización postural se consideraban justificados en la espera previa a cualquiera determinación quirúrgica y a esos medios se atribuía a menudo el éxito satisfactorio que más bien se debía a la tendencia espontánea a la curación.

Aun al aparecer las Sulfonamidas se obtuvo un número de cura-

ciones atribuibles a su uso, muy bajo en relación con lo que se esperaba

La Penicilina hizo a su vez esperar mejores resultados, pero se empezaron a referir resultados poco convincentes sobre todo tratándose de las supuraciones de anaerobios

Es interesante notar que desde que la Penicilina se ha popularizado el número de abscesos que llegan al especialista se ha reducido de modo considerable, lo que debe atribuirse a que esas supuraciones son tratadas con precocidad y de hecho son dominadas antes de llegar a la etapa abscedal

Antes del advenimiento de la Penicilina, cuando menos la mitad de los casos de absceso-pulmonar tenían que ser operados por los medios habituales en la etapa subaguda

Hoy es excepcional la intervención de ese género

Se presentan ocho casos de absceso pulmonar tratados por la Penicilina, en los que se pusieron en juego los recursos habituales antes de instituir el tratamiento por ese antibiótico

Se usaron las sulfonamidas al principio. Sobre todo por la escasez de Penicilina, se usó ésta por vía intramuscular y en todos los casos salvo uno, se recurrió a la aplicación de la droga por medio del broncoscopio una o varias veces, depositando la solución dentro del absceso y obteniéndose a partir de esa aplicación una definida mejoría, que en la mayoría no se había logrado por el uso de la Penicilina sola por vía intramuscular a dosis suficientes

El único caso en que no se obtuvo resultado favorable de este procedimiento, fué el de un cáncer supurado, comprobado por punción-biopsia

Las conclusiones a que llega el autor

1 El uso de la Penicilina en las supuraciones pulmonares debe ser tan prolongado como sea necesario para obtener la mejoría radiológica, clínica y hematológica de manera definida. Esta prolongación del uso de la Penicilina debe llegar mucho más lejos de lo aconsejado en otras enfermedades agudas antes de declarar su ineficacia

2 La mejoría que puede verse a los rayos X es mucho menos rápida que la clínica y la hematológica. Bajo tratamiento con Penicilina creemos que las cavidades se esterilizan relativamente antes de ser clausuradas anatómicamente

3 Cuando no se obtiene una respuesta favorable inmediata al uso de la Penicilina intramuscular, debe emplearse la aplicación de Penicilina in situ por el broncoscopio

4 No puede atribuirse sólo al uso del broncoscopio la mejoría notada en esta pequeña serie de casos, porque la experiencia anterior no demuestra una constancia de resultados favorables por uso solo, como la aquí referida

# Treatment of Spontaneous Pneumothorax\*

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Spontaneous pneumothorax, its etiology, pathogenesis and treatment present interesting problems in pathological physiology and clinical practice. Pneumothorax is either of exogenous or endogenous origin.<sup>1</sup> In exogenous pneumothorax, air enters the pleural space through an opening in the chest wall and parietal pleura. It is caused by trauma or more frequently by a therapeutic procedure (Induced pneumothorax). Endogenous pneumothorax results from leakage of air from the lung or the mediastinum into the pleural space. It may arise as a result of trauma, disease, congenital or acquired defect of the lung or pleura, or a combination of these factors. Since spontaneous pneumothorax implies a sudden entrance of air into the pleural space as the result of disease or congenital or acquired defect of the lung or air passages, exogenous pneumothorax and endogenous pneumothorax of traumatic origin do not enter into consideration in the present discussion. Cases of extra-pulmonary origin and cases resulting from tuberculous infection, pulmonary abscess, or infarct are also excluded, under these circumstances the therapeutic problem differs from that of the remainder of the group. It may be mentioned in passing that some varieties of traumatic pneumothorax by violence not involving penetration of the chest wall (blast injuries) and pneumothorax arising from certain therapeutic procedures (bronchoscopy intra-tracheal anaesthesia, tracheotomy) have somewhat the same pathogenesis as spontaneous pneumothorax. A classification of pneumothorax is suggested in the table below.

## *Exogenous*

Induced Pneumothorax

Therapeutic

Diagnostic

Induced Pneumoperitoneum

Trauma by external violence

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With penetration of chest wall (stab and bullet wounds)\*

*Endogenous*

Traumatic

External violence

Without penetration of chest wall (blast injuries, fractured ribs)

Therapeutic procedures

Bronchoscopy

Esophagoscopy

Intra-tracheal anaesthesia

Tracheotomy

Needling of the lung

Resuscitation (Violent artificial respiration, excessive positive pressure from mechanical resuscitators)

Non-traumatic (spontaneous pneumothorax)

Pulmonary

Pneumonia (primary or secondary)

Atelectasis (caused by obstruction of a bronchus by intrinsic or extrinsic growth, foreign body, or plugs secondary to infection, etc)

Pulmonary emphysema

Bronchial asthma

Silicosis

Tuberculosis

Abscess or gangrene of the lung

Neoplasm of the lung

Pulmonary infarct

Subpleural vesicles congenital and acquired subpleural cysts, emphysematous vesicles, scar tissue vesicles, congenital or acquired weakness of alveolar wall and/or pleura

Infection of the pleural cavity with gas-forming bacteria

Extra-pulmonary

Perforation of the oesophagus

Perforation of the trachea or the main bronchus

Perforation of the stomach or the intestine

What is the mechanism of production of spontaneous pneumothorax of such diverse etiology? There are no doubt several mechanisms involved, depending on the circumstances under which pneumothorax develops. With ulceration of a progressive lesion of tuberculosis, pulmonary abscess or neoplasm into the pleural space, there results a fistulous opening which is rather large and which does not close on expiration (an open type of pneumothorax which from a simple type may quickly evolve into a pyopneumothorax). The pathogenesis of pneumothorax under such conditions is quite obvious. However, the mechanism involved in other diseases, such as pneumonia, bronchial asthma, etc., or in apparently healthy individuals is debatable. There are several possible modes of production of pneumothorax in these various

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\*Here the endogenous factor may also be present, air entering the pleural space from pulmonary alveoli ruptured by the penetrating object

conditions The usually accepted theory is that a subpleural bleb, induced by straining, coughing, or other forms of violent activity (parturition, heavy lifting) ruptures into the pleural space The bleb may arise in a number of ways It may represent a blown out vesicle of emphysema arising as a result of involvement of a greater or smaller portion of the lung in some pathological process In bronchopneumonia small abscesses of the bronchiolar wall may become necrotic, and their rupture or that of the alveoli may lead to interstitial emphysema Coughing or straining would force air through such an opening, which dissecting along the septa would produce subpleural blebs<sup>2</sup> The rupture of small subpleural blebs has been considered as an etiological factor of spontaneous pneumothorax occurring in healthy people Thus it has been customary to ascribe the escape of air from the lung into the pleural space to rupture of an emphysematous bulla or perhaps to minute tears produced by the tug of adhesions However, it has been frequently impossible to demonstrate the existence of these changes either roentgenologically or by direct inspection Even if these conditions are responsible for spontaneous pneumothorax in some cases, they cannot explain it in all instances

It has been noted that spontaneous pneumothorax is frequently associated with mediastinal and interstitial emphysema Thus during the influenza epidemic of 1918-1919, Berkley and Coffen<sup>3</sup> reviewed 1701 cases of bronchopneumonia, in which series 9 patients developed extensive subcutaneous and interstitial emphysema Of these 9 patients 2 had an associated spontaneous pneumothorax

Some twenty years later Hamman<sup>4</sup> expressed an opinion that "one is justified in considering that the pneumothorax may be secondary to mediastinal emphysema" Elsewhere,<sup>5</sup> discussing spontaneous pneumothorax, he stated "It seems altogether likely that in most instances, if not in all, the air reaches the pleural cavity through the mediastinum I think that we must now at least entertain the possibility that the initial lesion of a spontaneous pneumothorax may be interstitial emphysema of the lung with an escape of air to the pleura through the mediastinum" Several features in some of the reported cases of spontaneous pneumothorax support Hamman's contention Also, reports on subcutaneous emphysema of the neck associated with spontaneous pneumothorax in asthmatics<sup>6</sup> suggest the possibility of mediastinal pathways for air

Pastorino<sup>7</sup> also suspected the existence of bronchovascular pathways for air through the mediastinum It remained for Macklin<sup>8,9</sup> to demonstrate that such pathways actually exist By introducing air under pressure into the terminal bronchi of experi-

mental animals and following its course histologically, he succeeded in demonstrating a break through the walls of the overdistended alveoli of the lung into the adjacent perivascular sheaths overlying the finer ramification of the pulmonary blood vessels. Once entrance has been gained to the perivascular sheaths, air can travel toward the hilum of the lung to the mediastinum and from there, by rupture through the pleura, into the pleural space. It can also travel from the mediastinum to the tissues of the neck, producing subcutaneous emphysema, or even to the retroperitoneal space. The possibility exists that the air may proceed in the opposite direction and lodge beneath the visceral pleura. The mediastinal pleura may be more resistant than the visceral pleura. Subpleural air-vesicles therefore are more likely to rupture and afford exit to air than is the mediastinal pleura. However, the pressure gradients carry most of the air, if not all of it, toward the hilum of the lung.

An attempt has been made by the Macklins<sup>10</sup> to introduce a common denominator in the pathogenesis of pneumothorax arising under many diverse conditions. The reader interested in this problem is referred to a recent paper by these authors<sup>11</sup> presenting a most comprehensive digest of the subject. Briefly the explanation is as follows. Pulmonary alveoli are of the two types (a) those which have their bases lying between other alveoli and (b) those with the bases resting against some structure other than adjoining alveoli. The latter class, with bases abutting upon bronchi, bronchioles, blood vessels, connective tissue, septa or pleura, is alone concerned in the production of pulmonary interstitial emphysema, and its sequelae (pneumomediastinum, pneumothorax, subcutaneous emphysema). As pores exist between the alveoli of the first type ("pores of Kohn"), air can pass from one alveolus to the adjoining one. But whenever air escapes from the base of the second type of alveolus, it can make its way only into one place, the underlying connective tissue. This constitutes the first step in the production of pulmonary interstitial emphysema, and later pneumomediastinum. Rupture of "marginal" alveoli is possible under the following circumstances: (a) Overdistension of the alveoli, without corresponding expansion of the lumen of the pulmonary vessels, permitting the establishment of a pressure gradient from the alveolus to the vascular sheath, (b) The same gradient may be created by reduction in caliber of pulmonary vessels, (c) Increased intra-alveolar pressure. Experimentally the Macklins demonstrated that the break-through is not only in the alveoli under the pleura, but also in alveoli throughout the depths of the lung, wherever they lie around the blood vessels.

The first of the above mentioned conditions (a), overdistension of the alveoli, occurs with overexpansion of some part of the lung as a phenomenon in connection with partial bronchial or bronchiolar obstruction through neoplasm, foreign body, or in pneumonia, silicosis, tuberculosis, measles and other infectious diseases. Similarly, the end result is identical in cases of general overinflation of the lung, as in insufflation anesthesia, post-operatively and in resuscitation, with the use of excessive positive pressure from mechanical resuscitators. In these circumstances factor (a) operates in combination with factor (c), i.e., increased intra-alveolar pressure.

The second set of conditions (b) is fulfilled in cases of pulmonary embolism. In combination with increased intrapulmonary pressure it occurs in parturition, violent straining, violent cough, asthma, blowing of wind instruments and blowing against resistance in general.

Factor (c), i.e., increased intra-alveolar pressure, usually occurs in association with over-inflation (Factor a) or reduction in vessel caliber (Factor b).

When spontaneous pneumothorax occurs in the train of events as above described, air may be demonstrated roentgenologically in the form of streaks along the vascular channels in the lung, air in the interstitial space between the pleural folds and the pericardium along the left border of the heart appears as a rather sharply defined translucent band outlining the course of the pericardial sac, especially along the upper part of its left border. In the lateral view air streaks may be seen in the anterior mediastinum between the cardiac silhouette and the chest wall. However, demonstration of air by x-ray studies in these locations may be difficult. Hamman<sup>5</sup> described a physical sign in patients with pneumomediastinum. It is apparently due to churning of air in the mediastinum by the impact of cardiac action. Over the precordium a crunching, churning or bubbling sound can be heard synchronous with cardiac systole. Even if not present at the time when the patient with spontaneous pneumothorax first presents himself for observation, a history of such an event may be elicited on careful questioning, for the sound may be audible to the patient himself. This is exemplified in the following abstract from the history of a patient observed by one of us (E.R.M.)

A 48 year old newspaper man stated that he had been in good health prior to the onset of his present illness, except for pneumonia in 1943. Since January of 1944 the patient had been serving as Assistant Sergeant at Arms for the State Legislature. His duties involved carrying rather heavy stacks of books of bills weighing between thirty to forty pounds. About two to three weeks prior to the onset of the attack to be described



below, he developed a slight cough productive of small amounts of white phlegm. About a week later, one night following a hard day's work, he suddenly heard a peculiar crunching sound in the right upper chest. This sound continued off and on for about a week or two and although causing him no discomfort it puzzled him a great deal. He felt quite well otherwise and had no other symptoms until the 11th of June, when at about 4 00 P M while walking down the street on his way home from work he suddenly was seized with a severe, sharp, knife-like pain in the right infraclavicular region extending down the right side of the thorax to the costal margin, lasting about two or three minutes. At the same time he experienced a tearing sensation inside of the right side of the chest. This was soon followed by marked breathlessness. Although the sharp knife-like pain disappeared, some pain on inspiration continued for one and one-half to two hours. Because of marked breathlessness and discomfort he was able to take only a few steps at a time but finally managed to get home. A roentgenogram taken by a private physician demonstrated a pneumothorax on the right side with a partial collapse of the lung. A week later this finding was corroborated on admission into the hospital.

When spontaneous pneumothorax arises in the course of pulmonary interstitial emphysema and pneumomediastinum, gas pressure built up in the mediastinum, largely as the result of coughing and straining, may impede the return flow of blood to the heart through low pressure venous channels, resulting in embarrassment of circulation. This, with the splinting of the lung by air along the perivascular sheath, may greatly enhance the already existing respiratory embarrassment caused by the pneumothorax through collapse of the lung and the shift of the mediastinum toward the unaffected side.<sup>11</sup>

Although the explanation given by the Macklins probably holds in a number of cases of spontaneous pneumothorax, as in individuals in whom no abnormality of the lungs can be demonstrated, and the source remains unknown even on autopsy,<sup>12 13</sup> there is no doubt that the older explanation of a "primary" rupture of a subpleural bleb still is true to fact in many instances, as proven by roentgenological studies<sup>14a b c d</sup> and direct observation on thoracoscopy.<sup>14c d</sup> There are undoubtedly many instances of spontaneous pneumothorax complicating pulmonary disease which pass unnoticed. For example, as remarked in a previous communication by one of us,<sup>15</sup> spontaneous pneumothorax complicating pneumonia may be masked by other grave symptoms of the underlying pneumonic process and thus not constitute a dramatic or distinct episode in the course of a serious illness. For this reason this complication is not recognized more frequently. With more extensive roentgenological studies in different chest conditions it may be found to occur much oftener than noted heretofore.

The course of spontaneous pneumothorax, particularly in the

apparently healthy, is usually benign, afebrile, and without exudate. There is a definite tendency to spontaneous recovery in 2 to 6 weeks, the duration being roughly proportional, in the absence of complicating factors, to the extent of the pneumothorax. However, complications do occur, the most frequent of these being recurrence which takes place in 20 to 45 per cent of cases.<sup>15 16 17</sup> Trudeau<sup>18</sup> reported a patient who had had spontaneous pneumothorax 12 times on the left side and 16 times on the right. Tension pneumothorax with mediastinal shift is reported in about 10 per cent of the cases.<sup>15</sup> This is a serious complication which is brought about by the action of a valve mechanism allowing air to enter but not leave the pleural space until a positive pressure has been attained, necessitating emergency treatment. The operation of such valve-like mechanism need not necessarily imply the presence of a traditional fistulous opening which presumably opens with inspiration and closes on expiration. When spontaneous pneumothorax arises as a result of pneumomediastinum, air leaks through the rent in the mediastinal pleura into the pleural space but cannot travel in the opposite direction. Occasionally spontaneous haemopneumothorax may occur when blood vessels are severed in the process of tearing of a pleural adhesion or rupture of a bulla.

Air in the pleural cavity does not always reabsorb, the pneumothorax may persist or become chronic. The condition may persist for months or even years. Perry reports a patient with a lung still collapsed after 20 years.<sup>19</sup> Another case of 30 years' duration has been reported.<sup>20</sup> In these instances there apparently exists a pleuro-pulmonary fistula which is prevented from closing perhaps by adhesions. Diaphragmatic movements transmit traction through the collapsed lung by means of adhesions to the diaphragm on the one hand and adhesions to the chest wall on the other. The patient, otherwise in good health, may remain handicapped by cardiac and respiratory embarrassment, which he may suffer even on slight exertion.

Spontaneous pneumothorax may not require active therapy, it may disappear by itself in a comparatively short time without much distress or inconvenience to the patient, particularly if he curtails his activities for the duration of pulmonary collapse. However, in cases of recurrent, chronic or tension pneumothorax, intervention may be indicated. Even in some instances of pneumothorax of comparatively short duration, such intervention may be necessary if the patient is under considerable distress from the combined effects of pulmonary collapse and underlying pulmonary disease. Thus a severe asthmatic already laboring under marked respiratory embarrassment of continued and unrelieved

bronchospasm may not be able to withstand long the added burden of pneumothorax. Seven deaths from spontaneous pneumothorax complicating bronchial asthma have been reported<sup>21-25</sup>

Although in simple pneumothorax the lung re-expands promptly, air may be aspirated from the pleural space at short intervals to hasten re-expansion of the lung. Aspiration of air must be undertaken cautiously, with withdrawal of small amounts of air (200 to 500 cc) at one sitting, to avoid high negative pressure which may be conducive to enlargement of the original opening into the pleural space or its persistence.<sup>1</sup> In recurrent pneumothorax aspiration of air is best avoided lest the leak persist or become larger. Instead, the induction and maintenance for several weeks of a low grade positive pressure pneumothorax by injecting air instead of withdrawing it may be indicated, to encourage the closure of a pleuro-pulmonary fistula. If this procedure fails in the case of recurrent pneumothorax, other measures may be tried, provided the patient is not greatly inconvenienced by the episodes of pulmonary collapse, in which instance no interference of any sort is necessary.

The production of an aseptic or "chemical" pleuritis has been tried in the hope of producing adequate and persistent adhesions between lung and pleura, sufficient to prevent repeated collapse of the lung. The substance most frequently employed is hypertonic glucose solution, 30 to 67 per cent.<sup>26-28</sup> This idea first occurred to Spengler in 1901 and has been used since by a number of workers.<sup>29</sup> Spengler also suggested the use of a 0.5 per cent solution of silver nitrate.<sup>29</sup> Other materials have been employed, among them the patient's blood,<sup>30</sup> guaiacol and iodoform,<sup>31</sup> iodized oil,<sup>28</sup> and a host of other substances, some of them tried only experimentally such as liplodol, mineral oil, India ink. Particulate matter, such as plain or iodized talc, powdered or in suspension, has been used for the same purpose. Intrapleural blood clot and fibrin are usually deposited on the costal pleura, less so on the diaphragmatic pleura. The parietal pleura is usually thickened, whereas the visceral leaf is rarely much changed. Hypertonic glucose solutions cause effusions but not adhesions.

Unfortunately chemical instillations are often painful and not infrequently accompanied by constitutional symptoms with or without pleural effusion. Neither are they universally successful. Injection of the patient's blood is not an unmixed blessing. It may lead to the organization of heavy deposits of fibrin on the visceral pleura preventing re-expansion of the lung. The risks of constrictive visceral pleuritis with encasement of the lung may be minimized when the above procedures are carried out only after the lung has already partially re-expanded, being not far away from

the chest wall, and when the remaining air is rapidly and immediately aspirated following the injection. It is essential with this form of treatment to get the parietal and visceral layers of pleura in contact at the earliest possible moment.<sup>1</sup> Alexander<sup>32</sup> considers the injection of irritating chemicals into the pleural space as useless, uncertain or dangerous.

Poudrage was introduced by Bethune<sup>33</sup> in 1935. This method consists in blowing iodized talc powder by means of a special blower, into a closed pneumothorax, under thoracoscopic guidance. It has been used with success a number of times. However, there are serious objections to this procedure. It places irremovable particulate matter within the pleural space and may cause severe pleuritis resulting in such thickening of the visceral pleura as to make re-expansion of the lung altogether impossible, thus defeating the original purpose. Ross and Fullerton<sup>34</sup> have found at autopsy that the pleura after treatment with poudrage was the site of a formidable foreign body reaction about 1 cm in thickness.

Besides introduction of foreign material into the pleural space, other methods consist of scarification of pleural surfaces, temporary phrenic nerve paralysis, severance of adhesions and excision of the bulla. Scarification of the parietal pleura or rubbing the pleural surfaces with gauze have been tried, but without too much success.

In persistent or recurrent pneumothorax closure of the pleuro-pulmonary fistula may be prevented by adhesions. Diaphragmatic respiratory movements transmitting traction through the collapsed lung by means of adhesions to the diaphragm and chest wall may keep the opening patent. In that case phrenic nerve paralysis or severance of adhesions at thoracoscopy or thoracotomy may be helpful.

Surgical closure of the tear responsible for the leak or excision of the offending bleb or bulla constitute the most radical and at the same time a more difficult operative procedure. The number of cases so treated is small. Such surgical approach is justifiable under certain circumstances in case of recurrent or persistent pneumothorax, particularly of the tension type. In favor of resection of the lesion itself is the more certain cure of the condition although recurrence is still possible. Also, pleural adhesions can be obtained with more certainty by rubbing the pleural surfaces with gauze and re-expanding the lung at the close of operation. Bigger<sup>35</sup> has reported one case in which he resected an offending bleb discovered upon exploration of the chest for the site of a bronchopleural fistula. Churchill<sup>36</sup> explored the pleural cavity in search of a valve vesicle, but was unable to locate the site of the fistula. Instead, he roughened the pleura

with gauze with good results Sycamore<sup>14c</sup> reported the radiographic appearance of a bleb, substantiated by thoracoscopy and later resected Tyson and Crandall<sup>37</sup> reported a patient with recurrent tension pneumothorax In this case cautery pneumonolysis was done first With the next recurrence, an emphysematous bleb visualized by roentgenography, and measuring approximately 5 cm in diameter, was excised A follow-up over a period of three years and seven months revealed an uneventful course, without recurrence, the patient working as a clerk in a grocery store Surgical intervention for persistent spontaneous pneumothorax was deemed advisable in two patients who came under our observation The added serious handicap of an underlying pulmonary condition made such intervention imperative Large emphysematous bullae are usually situated in the upper lobes, when the whole lobe is emphysematous it may be easier to perform a formal lobectomy rather than to attempt suture or excision of a single bulla Sutures do not hold in such frail emphysematous tissues The death of our second patient (Mr E K, Case 2) might have been prevented had a lobectomy been done instead of suture of the emphysematous portion of the upper lobe

*Case 1* M M, 37 year old white American male, had his first admission into the hospital on July 31, 1943 He gave a history of bronchial asthma of 10 years' duration and as a reason for present admission marked increase in dyspnea and chest pain since the 13th of July On entry the patient was seen to be a well developed, but somewhat undernourished man with sallow complexion and in moderate respiratory distress The positive findings were limited to the chest with characteristic expiratory rhonchi scattered over both lung fields The percussion note was hyperresonant over a portion of the left lung field and the breath sounds were markedly diminished over the same area Blood pressure 136/90 Pulse 104 The urinalysis was not remarkable The total leucocyte count was 10,400 with 9 per cent eosinophils The Wassermann reaction of the blood was negative The roentgenogram of the chest revealed a pneumothorax on the left side with moderate compression of the lung from the apex to the base and a small amount of pleural effusion obscuring the left costophrenic angle The course in the hospital was afebrile and rather uneventful In a month, the lung completely re-expanded and the patient was discharged from the hospital on the 3rd of September

The second admission was on the 25th of December, 1944, at which time he stated that 5 weeks prior to entry he again developed marked breathlessness with chest pain On entry the patient was seen to be in marked respiratory distress The physical findings were the same as on previous admission except that at this time the hyperresonance on percussion with markedly diminished or totally absent breath sounds was found over the entire left lung field The leucocyte count was 14,600 The roentgenogram of the chest showed a left pneumothorax with a practically total collapse of the lung and displacement of mediastinum to the opposite side The manometric reading was plus 2,

plus 6, indicating that this was a tension pneumothorax. No evidence of acid-fast infection was found on inoculation of a guinea-pig with the patient's sputum. Patient's condition remained unchanged, with low grade fever, and continued marked respiratory distress. The lung remained totally collapsed when finally, after 5 week's stay in the hospital, a decision was made to operate. On the 6th of February operation was done by one of us (L. E.) under satisfactory ether anesthesia administered through an intratracheal tube. Anterior incision through the 3rd intercostal space with infracture of the 4th rib gave sufficient access. Immediately upon opening the chest one could see what looked like a rent in the anterior surface of the upper lobe. This was oval in shape measuring about 1 cm by  $\frac{1}{2}$  cm and in its base a meshwork of fibers could be seen. It looked like a typical ruptured emphysematous bulla. It was difficult to assert this with certainty because the defect was on the front of the lung lying on its upper surface. Therefore it was impossible to submerge it in water and so demonstrate that it bubbled. However, the chest was filled with water and no other bubbling focus could be visualized. The above mentioned defect was sewed over first with a cross-stitch of catgut and when air was seen to escape from the stitch-holes it was again grasped with a sponge-stick and this in turn was surrounded with another catgut ligature. Positive pressure was stopped in order to see whether the lung would collapse. One could not see the upper lobe with certainty but the lower lobe, even when the pressure was removed, remained at least 50 per cent distended, thus demonstrating an obstructive type of emphysema. Both visceral and parietal pleurae were about 1 mm. in thickness. The lung was brought out to the surface of the pleura, where re-inflating it, the remaining air bubble was displaced by salt solution and the chest was closed except for a catheter which was led off under water in order to insure against subcutaneous emphysema. After being brought to bed the man was much less cyanotic and breathed easily. No air escaped from the catheter.

Following return to the ward, the patient's condition remained good. There was considerable relief from dyspnea with a corresponding increase in his well being. The postoperative course was essentially uneventful and a roentgenogram of the chest taken two days following surgery revealed the left lung to be completely re-expanded. On the third postoperative day the catheter was removed. The patient developed considerable cough and sputum with numerous scattered rhonchi but this cleared and on the 7th postoperative day he was allowed out of bed. He was kept under observation for two more weeks, the lung remained re-expanded and he was discharged to his home. Ten months after discharge from the hospital there had been no recurrence of his pneumothorax.

*Case II* E. K., 47 year old white American male, was admitted into the hospital on the 25th of January, 1945. He stated he had enjoyed excellent health in the past and except for a slight "cigarette cough" in the mornings, had been asymptomatic. A few days before the New Year he had become wet in the rain. He did not take cold, however, but on the day after New Year's, upon walking to the carline, he suddenly became dyspneic. Apparently the breathlessness was severe enough to force him to return to his home rather than go to work. A diagnosis was not made. The patient remained in bed more or less since the onset of his present illness and noted marked shortness of

breath upon very slight exertion such as getting in and out of bed and going to the bathroom. There was no previous history of dyspnea with exertion, ankle edema, hypertension or rheumatic fever and he denied chest pain, hemoptysis, fever or sweats. There was no history of weight loss.

On entry, the patient was seen to be a fairly well developed but rather poorly nourished man, slightly dyspneic. The essential physical findings were limited to the chest with hyper-resonance on percussion over both lung fields, being more marked on the right where the breath sounds were totally absent. Blood pressure 120/95. Pulse 108. He had a low grade fever. The red cell count was within normal limits, the total white cell count was 20,000 with 70 per cent polymorphonuclear leucocytes. The blood test for syphilis was negative. The roentgenogram of the chest revealed a pneumothorax on the right with a practically total collapse of the lung and slight displacement of the mediastinum to the opposite side. The initial manometric reading was plus 1, minus 1, and plus 1, minus 4, upon aspiration of air. No acid-fast organisms were grown on culture of the sputum. With the failure of the lung to re-expand it was decided to operate. The operation was performed by one of us (L. E.) on the 19th of February. A needle introduced into the second interspace anteriorly with the man recumbent on his back measured an intrapleural pressure of plus 3, plus 1. Upon sniffing against a closed glottis a maximum negative pressure of minus 4 was registered. The chest was opened in the third interspace. Access was poor, on which account the third rib was transected in the anterior axillary line. One could then see in the right upper lobe a mass of huge emphysematous bullae, the largest about the size of a hen's egg. At the junction of two of these bullae air streamed out from a small hole about 2 mm in diameter. This was easily seen on filling the chest with water. An attempt was made with a sponge-stick to grasp the region of the small opening, surrounding the sponge-stick with a ligature. In so doing further tears of the above mentioned bullae resulted and were controlled only after a number of the bullae were grasped and drawn up into two chromic catgut ligatures which gathered the whole apical region into their knot. A number of adhesions between the upper lobe and the chest wall were severed for the purpose of applying this ligature and a portion of the lung distal to the ligature was resected. After the leak in the upper lobe had been secured an attempt was made to inflate the lower lobe under strongly positive pressure. However, pressure of 20 cm of water applied for some ten or fifteen minutes failed to succeed in inflating the lower lobe which remained as a gray, flabby, carnified structure at the bottom of the right chest. Failure to expand this lobe was probably due to an unclosed air leak elsewhere. A catheter was introduced through about the 6th or 7th interspace in the axillary line and led out under water. The patient who was anesthetized with a single dose of 1 gram of pentothal did not breathe spontaneously. On bronchoscopy some frothy secretion was aspirated from the right lower lobe but scarcely enough to explain either the collapse of this lobe or the absence of respiration. Finally, with the aid of coramine, oxygen and other stimulants, shallow respiration was induced and maintained under an oxygen tent. The wound was closed and a pressure dressing applied.

Following surgery, because of the shallow respirations, the patient

was kept in the oxygen tent. Respiration gradually improved and the following day the tent was removed, the patient breathed without difficulty and gave no evidence of cyanosis. On the first postoperative day subcutaneous emphysema developed involving the face and neck. A small flat sandbag was placed over the operative area. However the subcutaneous emphysema increased and spread to involve the shoulders and upper arms and even the scrotum. A rubber drainage tube was inserted into the incision under the skin and suction applied. In spite of this the emphysema increased, the rubber drain was removed and a large bore needle was replaced. At 9 00 P M on the second postoperative night in spite of the marked emphysema his breathing was not labored and the patient was comfortable and in good spirits. Three hours later he suddenly became cyanotic and expired. Permission for autopsy could not be secured. A roentgenogram of the chest taken on the day of death revealed the right lung to be only partly collapsed.

### *Comment*

In both patients presented, the subpleural emphysematous bullae proved to be the offending lesion. In the patient with bronchial asthma, the pneumothorax was of the tension type. In both instances the collapsed lung failed to show any tendency to re-expand in periods of six and ten weeks respectively. The operation for tension pneumothorax was successful. The lung remained re-expanded when the patient was last seen six months postoperatively. In the other patient exitus followed on the second postoperative day. Malignant interstitial emphysema with widespread infiltration of air through subcutaneous tissues culminated in death, as it always does unless the pressure in the mediastinum is relieved by incision through the jugulum. Unfortunately, in the case under discussion the decision to intervene was not made promptly enough. It would have been better to have proceeded to resect the whole upper lobe rather than to have closed the chest over this unsatisfactorily sutured extensively emphysematous part of the lung. At times the peripheral walls of the bullae give way so extensively that the pleural surface of the lung is converted over an area of several inches into a fine mesh-work of elastic trabeculae which lie closely applied to the surface of the pulmonary pleura. Countless small bronchial fistulae then result. These wide-spread surface ruptures cannot be securely sutured, nor leaks through them effectively closed. Lobes with these changes are better removed in their entirety or sub-totally, the bronchial stump being securely sutured and covered over with pleura or with adjacent normal lung.

Repair or excision of the offending lesion in spontaneous pneumothorax may be technically difficult, and inexact closure fraught with disastrous results. The lesion may be difficult to find and when found is not always amenable to closure or extirpation with



reasonable ease When this is so, lobectomy should be performed rather than ligature, suture or excision of the peripheral lesion Therefore, this radical approach is to be resorted to only when the pneumothorax is disabling, repeatedly recurrent or obstinately persistent

### RESUMEN

- 1 Se presenta una clasificación de neumotorax
- 2 Se discute el mecanismo del neumotorax opinándose que el neumotorax espontáneo es debido
  - (a) Al mecanismo conocido, es decir a la perforación de un absceso, de una caverna, etc , al espacio pleural libre
  - (b) A un mecanismo menos conocido en donde una ruptura alveolar o bronquiolar abre los espacios perivasculares del pulmon a la entrada de aire, el que penetra en ellos extendiéndose hacia el hilio y el mediastino, produciendo un enfisema intersticial Desde el hilio y el mediastino el aire penetra a la pleura Este mecanismo explica la producción simultánea de un neumotorax y de un enfisema mediastinal
- 3 Los alvéolos pulmonares tienen dos formas
  - (a) Una que tiene su base rodeada por otros alvéolos
  - (b) Otra que tiene su base apoyada contra otros elementos pulmonares, así como brónquios, bronquiólos, vasos sanguíneos, pleura, etc

Como los alvéolos de la forma (a) están conectados entre si, ésta forma no da origen a un neumotorax intersticial Con la ruptura de alvéolos de la clase (b), el aire escapa al tejido inter-alveolar produciendo un enfisema intersticial, hilar, y a veces un neumotorax
- 4 Se discuten las condiciones y los detalles de este ultimo mecanismo
- 5 Se discuten las indicaciones terapeuticas del neumotorax
  - (a) Aspiración
  - (b) Inyección de aire y establecimiento de un neumotorax a presión positiva
  - (c) Inyección intrapleural de varias sustancias capaces de producir una pleuritis aseptica o "química," como suero glucosado hipertónico, sangre, talco, etc
  - (d) Tratamiento quirúrgico por cierre de la fistula, por resección de la parte enfisematosa del pulmon o por lobectomía
- 6 Se citan dos casos de neumotorax espontáneo tratados quirúrgicamente

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# A Plea for Increased Caution in the Use of Surgical Collapse Therapy for Pulmonary Tuberculosis

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Not many years ago—within the lifetime of some of us—pulmonary tuberculosis was considered an almost hopeless disease. Patients were advised to “go out West and rough it,” and those who did recover did it in spite of this advice rather than because of it. Examples of the fatalistic attitude prevalent in those days are too well known to all of you to merit discussion at this time. In 1877, what we consider to be the most significant advance in therapy in the recent history of the disease—the systematized sanatorium rest treatment—was popularized in this country by Trudeau, a few years after having been introduced abroad by Brehmer and Dettweiler.

Artificial pneumothorax, which had been suggested centuries before,<sup>7</sup> was introduced in Milan by Forlanini and about 1900 began to be used in this country. Other means of collapse therapy were introduced in rapid succession.

## ARTIFICIAL PNEUMOTHORAX

It has been recommended, and has been, with some, a regular practice, to institute pneumothorax as soon as there is radiographic evidence of any tuberculous pulmonary lesion. While it is obviously better to heal a minor lesion by means of a minor operation than later to arrest a severe lesion by a major operation, we think that operations should be reserved for occasions in which they are indicated, and to us the presence in the lung of an area of increased density compatible with pulmonary tuberculosis is far from being an indication for collapse treatment.

Furthermore, we do not approve of the early institution of artificial pneumothorax in non-cavernous lesions confined to a small part of one lung even if they are undoubtedly tuberculous. Such lesions improve and heal as a rule on sanatorium regimen, and if the patient in years to come has a recurrence of his tuberculosis, the pneumothorax is then available. If the lesions progress or fail to improve on rest in bed, the collapse may then be instituted.

It must also be considered that there are certain dangers inherent in any procedure which involves entering a body cavity. With due precautions illness resulting from artificial pneumothorax is rare and death rarer, but rare as they are, they must be considered when deciding on the type of therapy. Of course, in many cases the dangers to be expected from not collapsing the lung far outweigh those inherent in a pneumothorax. In certain instances, however, there are additional and special dangers to be considered. We agree that pneumothorax should be attempted even though it appears that adhesions between the visceral and parietal pleurae may reasonably be expected to prevent a satisfactory collapse. It is well known that such "expected adhesions" are frequently not present, or are of such nature that intrapleural pneumonolysis may be easily performed. If the adhesions are apparently unsuitable for intrapleural pneumonolysis, we feel that they should, nevertheless, be inspected by means of a thoracoscope, for it is not unusual for an intrapleural pneumonolysis which from x-ray appearance had presented little hope, to be successful.<sup>4</sup> If satisfactory severing of adhesions is seen to be too dangerous, we think that it is, in most cases, even more dangerous to try to stretch the adhesion or tear it from the chest wall by the use of positive pressures. There are various degrees of this danger. If the adhesion is thin and the underlying lung is in fairly good condition, cautious attempts to free or stretch the adhesions are as safe as the nature of the procedure permits. Such adhesions, on the other hand, may be severed with a still greater degree of safety. If the adhesion is thick, sufficient strain on the tissues may tear the pleura and produce a traumatic pneumothorax. This may occur either at the base of the adhesion or at a more distant point. In cases in which the underlying lung is considerably diseased, the application of high positive pressures is exceedingly dangerous. Especially is this true when, as is often the case, the adhesion is over a large or moderately large cavity which is close to the periphery of the lung. The underlying diseased and friable lung may tear and produce the dreaded complication of mixed or tuberculous empyema. Partial cutting of adhesions unsatisfactory for complete lysis, in the expectation that weakening at one point will result in their lengthening or complete separation, has been recommended.<sup>5</sup> We think that this should never be attempted, as the incidence of empyema following this procedure is quite high.<sup>3</sup>

The same principles may be applied to the introduction of air into small pockets. No great good can be expected from the amount of collapse obtainable by such means, and every refill presents grave dangers. We have all seen cases in which the introduction of 50 or 100 cc of air converted a negative pressure into a highly

positive one In pneumothorax therapy our objective is to reduce the elastic tension and thereby reduce the strain on the lesion Certainly 50 cc of air cannot reduce elastic tension to any great degree, and the production of high positive pressures may lead to catastrophe In such a case, the pneumothorax should be abandoned and other means of collapse therapy considered if it is deemed indispensable

The danger of producing injury by the introduction of air under high pressure can be minimized by the use of an apparatus which is incapable of delivering air at high pressures without special adjustment The type of pneumothorax machine which we have found most satisfactory ordinarily delivers air at a pressure of about twenty centimeters of water, and may be adjusted to deliver it at atmospheric pressure, negative pressure, or high positive pressure Such a machine is in our opinion the safest type, especially for initial pneumothoraces Other machines which we have seen in use always deliver the air at a relatively high pressure, the pressure being produced by the use of a pump or by the weight of a column of mercury These machines make it possible inadvertently to produce pressures which may do irreparable damage

The advantages of short-bevelled needles in pneumothorax administration are well established, but sharp needles are still too frequently in use If everyone who used a sharp needle reminded himself as he picked it up that Alexander<sup>2</sup> reported a three inch gash in a lung as the result of the lung's brushing against the tip of a needle, there would soon be few in use The danger of laceration of the lung is greater at the lower lateral portion of the lung than elsewhere, for the motion of the visceral pleura relative to the chest wall increases from above downward, being relatively small at the apex Unfortunately the most satisfactory place to introduce a needle is usually near the mid-axillary line

There are some few types of tuberculosis of the lungs which inherently contraindicate even an attempt at pneumothorax In acute pneumonic tuberculosis the danger of empyema complicating the pneumothorax is very great<sup>10</sup> In such a case collapse should not be attempted until the acute process has subsided, and then only if the lesions appear to be amenable to temporary collapse therapy Likewise, if there is extensive cavitation throughout one lung or huge cavities in any area, attempts at pneumothorax are likely to be without any beneficial effect

As has already been indicated, we think that after pneumothorax is instituted, adhesions which are attached to the lung in such a way as to interfere with the collapse of cavities should be severed by means of closed intrapleural pneumonolysis if possible If they are making traction upon a diseased portion of the lung and *there-*

*by interfere with satisfactory healing*, intrapleural pneumonolysis should be performed. The fact that collapse should be as limited as is compatible with healing should be considered when deciding this.<sup>9</sup> For a time one of us was convinced that all visible adhesions should be cut if their nature permitted it, but we have abandoned this view. We are not unaware that there have been reports indicating that activation of lesions at or near the site of attachment of adhesions sometimes occurs. Whether this happens because the tug of the adhesion prevents complete healing of the lesion, or because the adhesion is evidence of an underlying area of diseased tissue, we are not prepared to state dogmatically, we incline to the latter idea. The question of an adhesion's being detrimental to the ultimate prognosis of an arrested lesion after the lung has been allowed to re-expand seems academic, in view of the fact that multiple adhesions may be expected to form when the visceral and parietal pleurae are allowed to contact one another after pneumothorax is abandoned. Probably most cases of reactivation of apparently arrested lesions are caused by failure to persist in treatment long enough.

Moreover, attempts at pneumonolysis do not always result in an improvement in the anatomical factors affecting the success of pulmonary collapse. We have seen many pneumonolyses performed under what in retrospect seem to us to be rather dubious indications which ultimately resulted in considerably worse conditions than were present before the operation, in some cases so much so that the pneumothorax had to be abandoned. Such un-



Figure 1



Figure 2

foreseen misfortunes occur also in pneumonolyses performed with the best of indications, but in such cases the probability of benefit outweighs the possibility of harm. On the other hand in cases in which continued improvement might reasonably be expected without the severance of adhesions we believe that the possibility of harm outweighs the possibility of benefit, since complications may occur even when the greatest care is taken to avoid them.

If adhesions interfere with satisfactory collapse in such a manner as to render healing of the lesion unlikely, and cannot safely be severed, other means of obtaining the desired collapse or of augmenting the collapse already present must be considered. Revokable operations naturally come first to our minds.

### PHRENIC NERVE INTERRUPTION

Phrenic nerve operations used alone have in our experience shown such meagre results that we have abandoned their use except in very extraordinary cases. The use of phrenic interruption in conjunction with other procedures will be discussed as those procedures are considered.

### PNEUMOPERITONEUM

The problem of decreasing the volume of the thoracic cage may also be approached from below rather than from above the diaphragm. The idea of raising the diaphragm by injecting air into the peritoneal cavity is not new but has recently attracted more attention. Some authors have stated that there is less rise of the



Figure 3



Figure 4



diaphragm when the patient is lying down than when he is sitting or standing. There is, independent of other factors, an increase in residual air which results in a decrease in vital capacity, when the patient assumes the supine position. When he is prone, the residual air is reduced and the vital capacity even less than in the supine position. These changes are the result of changes in the position of the vertebral column, but it may be that their presence has influenced those who advocate the sitting position. If diminution of vital capacity is the end desired, the patient is better off lying down. One of us (W W C) has measured the vital capacity of two patients receiving pneumoperitoneum and found that the vital capacity was 600 cc greater in the erect than in the supine position in one case and 150 cc greater in the other. The vital capacity in the erect position in one was 450 cc less than before pneumoperitoneum was begun, and in the other 100 cc more. Both of these patients had phrenic nerve interruptions.

- |   |         |
|---|---------|
| 1 Before pneumoperitoneum standing          | 2300 cc |
| After pneumoperitoneum and phrenic standing | 2400 cc |
| After pneumoperitoneum and phrenic supine   | 1800 cc |
| 2 Before pneumoperitoneum standing          | 1900 cc |
| After pneumoperitoneum and phrenic standing | 1450 cc |
| After pneumoperitoneum and phrenic supine   | 1300 cc |

If the phrenic nerve is interrupted, there is some rise in the diaphragm. It must be borne in mind that pneumoperitoneum is a procedure which should be done with the greatest caution and care, preferably by one experienced in its use. Its greatest value



Figure 5



Figure 6

hes in its ability to enhance the diaphragmatic rise following phrenic nerve operation and this may sometimes be done in order to prepare a patient for surgery in less time than would be possible by rest in bed alone

### EXTRAPLEURAL PNEUMONOLYSIS

Extrapleural pneumonolysis, first performed by Tuffier in 1891, has had an extensive trial both in this country and elsewhere. Some of the results have been most discouraging. Sputum conversion is obtained in only about 50 per cent of cases with extrapleural pneumothorax, and complications are numerous and grave.<sup>6 11 12</sup> In several series that have been reported, about one third of the patients developed extrapleural empyema. Of these empyemas approximately two thirds were tuberculous and one third mixed.<sup>6 11 12</sup> Some of the substances used to fill the space have proved unsatisfactory. Although early results from extrapleural pneumothorax are sometimes reasonably good, as the post-operative period increases so also do the complications. Furthermore, extrapleural pneumothorax, although theoretically revokable, actually is in most cases irrevokable, since expansion does not easily occur when refills are discontinued. A thoracoplasty may finally be needed to close the space, and is then more difficult than the usual primary thoracoplasty.<sup>6</sup> The operative risk, the frequency of complications, and the uncertainty of the end results indicate that extrapleural pneumothorax should probably be used only in cases in which the prognosis is very poor without surgery, and other surgical procedures including thoracoplasty cannot be employed. Occasionally an extrapleural pneumothorax may be used to prepare a patient for thoracoplasty. Alarcon<sup>1</sup> has recently published a rather enthusiastic article concerning extrapleural pneumothorax.

### THORACOPLASTY

Properly performed thoracoplasty is, in suitable cases, one of the most useful operations in our armamentarium. Reports of good results from bilateral thoracoplasty are not at all rare, and we have had the good fortune to see some of our own patients benefited by it. Innumerable persons owe their lives to unilateral thoracoplasty.

The excellence of the operation should not lead us to disregard contraindications or prescribe its use too freely. We must remember that it is a dangerous and mutilating operation, so much so that patients not infrequently refuse it because of the deformity produced. Improvement in surgical methods has reduced the disfigurement, but it is still enough to be most unwelcome to the patient,

particularly if a woman Every effort should be made to avoid the necessity of thoracoplasty, and then if it is finally apparent that cure is impossible without it, we can go ahead with a clear conscience Too much delay, of course, may be fatal The moment must be seized In nearly every fatal case a review of the records will reveal a time when an operation might have been done and the patient cured—but tuberculosis, like the tide, waits for no man

Once thoracoplasty is decided on we must carefully consider the lesions not only on the side to be operated but also in the contralateral lung Irreversible surgical collapse in the presence of an unstable lesion in the opposite lung is fraught with hazards, a patient with a large cavity on one side and a thoracoplasty on the other, while not necessarily hopeless, certainly is no welcome sight to most physicians It is almost always better to delay the operation until the contralateral lesion is stable than to try to cure the opposite lung after the operation Incidentally, paralyzing the diaphragm on the contralateral side in an effort to hasten healing so that surgery can be performed sooner is likely to turn out quite badly If an appreciable collapse is expected, there must also be expected a concomitant decrease in vital capacity If this decrease in vital capacity happens to be enough to make thoracoplasty impracticable, we have removed one contraindication only to substitute another

Intrabronchial spread of the disease to the contralateral lung or to other portions of the same lung during or after thoracoplasty may occur in spite of all precautions, but much may be done by the internist, surgeon, and anesthetist working as a team to lessen its incidence <sup>14</sup> The patient should empty his cavities and bronchial tree as well as he can before the operation by means of cough and postural drainage If preoperative bronchoscopy is to be employed, the bronchi may be aspirated by means of a tube Preservation of the cough reflex is important Narcotics and sedatives should therefore be employed sparingly, and the anesthetic be such that the patient reacts quickly If large amounts of infective material are present in the bronchial tree, coughing is as likely to further the spread as it is to rid the lung of the material, so that the initial step of cleaning out the bronchial tree and cavities is very important The anesthetist can aid greatly by keeping the bronchial tree as dry as possible throughout the operation Passive movement should be instituted and active movement encouraged very early

### RESECTION OF PULMONARY TISSUE

Pneumonectomy and lobectomy for pulmonary tuberculosis we have had little experience with Excepting those who had complete

blockage of a large bronchus by an endobronchial tuberculous lesion, such patients as we have had who might have been benefited by resection of pulmonary tissue seemed curable by less heroic means. Further advances in surgery may well make this the operation of choice in many cases.<sup>4,13</sup> Theoretically it is ideal, the diseased tissue is removed, there is no possibility of a breakdown of the old lesion, and the patient is not disfigured. It has been shown many times that the absence of one lung is compatible with health and longevity. We now think that tension cavities which do not respond to other treatment and tuberculomas which produce positive sputum should be treated by resection if the condition of the contralateral lung is satisfactory. Resection should probably not be used in any case in which another form of treatment is likely to be successful.

#### OPERATIVE CAVITY DRAINAGE

Cavity drainage by means of the Monaldi operation is in some cases a valuable adjunct to other treatment. We have not had the good fortune with the operation that Monaldi had, nor have we seen such good results in the hands of others. Successful drainage in some of our cases has produced considerable temporary benefit but always had to be supplemented by more permanent procedures, inasmuch as cavities which had apparently closed, promptly reopened when the tube was removed. The dangers of the Monaldi procedure are obvious, but accidents occur less frequently than might be expected. If other procedures are at the time impractical, this operation may be resorted to in an effort to put the patient in shape for further surgery but should not be expected to produce permanent results when used alone.

#### SUMMARY

Surgical collapse of the diseased lung is an important adjunct to rest and supportive therapy in the treatment of tuberculosis. The excellent results obtained in many cases by means of surgical collapse have, however, led many persons to prescribe its use too freely, or, having successfully collapsed a lung, to fail to continue a regimen of rest and supportive therapy. The success of some methods of collapse (fi artificial pneumothorax, thoracoplasty) has perhaps led to excessive use of less desirable methods such as extrapleural pneumothorax.

Whenever surgery is considered in a case of tuberculosis, the following questions must be answered. First, in what way will the patient be benefited by this operation? Second, do the hazards and complications, both immediate and remote, of the operation present a lesser danger than a decision to defer or abandon the

operation? It is readily apparent that no blanket answers to these questions are possible. Each case must be decided on its individual merits. In tuberculosis as in other diseases the potential dangers of any operation must be weighed against the expected benefits. Above all, operations should never be done simply because they are possible, or in an effort to "do something". A haphazard approach will subject the patient to consequences which he can survive only with the greatest good luck.

### RESUMEN

El colapso quirúrgico del pulmón afectado es un auxiliar importante al reposo y a la terapia sustentante en el tratamiento de la tuberculosis. Los excelentes resultados obtenidos en muchos casos mediante el colapso quirúrgico, sin embargo, han inducido a muchas personas a prescribir muy liberalmente su empleo o, después de haber colapsado eficazmente un pulmón, a no continuar el régimen del reposo y de la terapia sustentante. La eficacia de algunos métodos de colapso (vg el neumotórax artificial, la toracoplastia) quizás ha conducido al uso excesivo de otros métodos menos deseables, tales como el neumotórax extrapleuraleal.

Cuando quiera que se considere la intervención quirúrgica en un caso de tuberculosis, deben contestarse las preguntas siguientes. Primero. En qué forma beneficiará la operación al paciente? Segundo. Presentan los riesgos y complicaciones de la operación, tanto inmediatos como remotos, un menor peligro que la decisión de aplazar o abandonar la operación? Es claro, evidentemente, que no se les puede dar contestaciones generales a estas preguntas. Debe decidirse cada caso a base de sus méritos individuales. En la tuberculosis, así como en otras enfermedades, deben compararse los peligros potenciales de cualquiera operación con los beneficios esperados. Sobre todo, nunca se debe llevar a cabo una operación simplemente porque es posible su ejecución, o con el fin de "hacer algo". Esta actitud aventurada expone al paciente a tales consecuencias que si no pierde la vida es porque tiene muy buena suerte.

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## Intrapleural Pneumonolysis\*

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Artificial pneumothorax has been and still is the most popular form of collapse therapy in the treatment of pulmonary tuberculosis. There is no doubt that a therapeutic pneumothorax, to be successful, must have effected cavity closure and rendered the patient's sputum negative. All pneumothorax workers should employ the operation of intrapleural pneumonolysis for their patients when the indication arises. By such a procedure a great per cent of the cases with a poor pulmonary collapse will be converted into a satisfactory collapse. Jacobaeus in 1913 devised a method of severing adhesions under direct vision. He utilized two cannulas, inserting through neighboring intercostal spaces one resembling a cystoscope, by means of which the adhesions were brought into direct view, the other providing a means of introducing the galvanocautery (Table I).

From 1934 to 1944 inclusive, 612 patients at the Boston Sanatorium were submitted to thoracoscopy. In 79 of these patients a pneumonolysis was not attempted because it was considered unsuitable and, in all probability, dangerous due to the character of the adhesions. In the remaining 533 patients a total number of 605 pneumonolyses were performed, 442 operations being classified as complete and 163 as incomplete. By complete pneumonolysis we mean the severing of all visible adhesions. By incomplete pneumonolysis we mean a partial division of one or more adhesions or the complete division of a fraction of the total number (Table II).

A single stage operation was performed on 485 patients, two stage operation on 16 patients, three stage operation on 4 patients, 27 patients had bilateral pneumonolysis, and 1 patient had a two stage bilateral pneumonolysis (Table III).

Of the 533 patients receiving a pneumonolysis, 323 were females and 210 were males. The youngest in the group was 17 years old and the oldest 52 years of age. The average age was 25 years. The average duration of pneumothorax prior to pneumonolysis was 12 weeks. The instrument employed in our series of operations was the Coryllos thoracoscope and galvanocautery. All instruments

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should be tested carefully before every operation to make sure that the light bulb, cable connections, and current are in good working order. The position of the patient on the table depends upon the operative approach. In most instances the patient is placed on his sound side with a pillow beneath the shoulders. There should be no hesitation in having the patient sit up or turning the trunk if such positions bring the adhesions into better view. The medication employed was morphine sulfate, gr  $\frac{1}{4}$ , and scopolamine sulphate, gr  $\frac{1}{150}$ , a half hour before operation. Local novocain anesthesia was used with especial care to infiltrate the parietal pleura.

TABLE I  
*Statistics on Intrapleural Pneumonolysis*

<i>Total Number</i>	<i>Cases</i>	<i>Per Cent</i>
Thorascopies	612	
Patients having pneumonolysis	533	87
Females having pneumonolysis	323	60
Males having pneumonolysis	210	40
Patients unsuitable for pneumonolysis	79	13
Females unsuitable for pneumonolysis	51	64
Males unsuitable for pneumonolysis	28	36

TABLE II  
*Type of Operation*

<i>Total Number</i>	<i>No of Operations</i>	<i>Per Cent</i>
Pneumonolyses	605	
Complete pneumonolyses	442	73
Incomplete pneumonolyses	163	27

TABLE III  
*Number of Pneumonolyses in Stages*

	<i>Cases</i>	<i>Operations</i>
Single stage pneumonolysis	485	503
Two stage pneumonolysis	16	32
Three stage pneumonolysis	4	12
Bilateral stage pneumonolysis	27	54
Bilateral two stage pneumonolysis	1	4
TOTAL	533	605



The openings in the chest wall should be made after careful study of the adhesions both by roentgenograms and fluoroscopy. In the great majority of the cases the 2nd intercostal space in the midclavicular line and the 3rd interspace in the mid-axillary line were found suitable for thoracoscopy and pneumonolysis. Pneumonolysis requires a great deal of patience and care. All adhesions should be studied in relation to one another, in relation to lung tissue and important structures. Whenever possible, adhesions were severed near the chest wall. At this point there is less danger of injury to the lung and less tendency to bleeding.

Usually thoracoscopy revealed more adhesions than were seen by roentgenograms. The importance of thoracoscopic examination cannot be overemphasized in pneumothorax cases presenting adhesions. Valuable information is gained in studying the pleural cavity, the character of the adhesions, and the type of pulmonary collapse. If a pneumonolysis is impossible, a useless pneumothorax can be discontinued and another form of collapse instituted.

The character and number of the adhesions in the majority of cases could not be foretold by roentgenograms. Some cases which appeared to be difficult on roentgenographic study presented no trouble whatsoever at time of operation. On the other hand, sometimes patients presenting adhesions which by roentgenograms appeared simple, at time of operation offered more difficulty than expected. In order of frequency, the following types of adhesions were encountered: string, fan, cord, band, funnel and curtain.

At the time of operation the sputum was positive in 75 per cent of the cases with evidence of cavitation. We were able to bring about a negative sputum in 63 per cent of all cases operated upon.

All complications occurring within the first four post-operative weeks as well as those occurring later relating to the operation, have been regarded as attributable to the operation rather than to the coexisting tuberculosis and pneumothorax.

Large intrapleural hemorrhage is a fairly rare but, depending on its source, a most dangerous complication. The loss of a small amount of blood either from trocar wounds or cauterized adhesions has not been regarded as a hemorrhage. In our series we encountered 3 cases of intrapleural hemorrhage, 2 of which required aspiration. The source of the hemorrhage in each case was an intercostal vessel injured by the introduction of the trocar.

A slight degree of subcutaneous emphysema occurs in a fairly good number of cases. The emphysema usually clears up in several days. We encountered marked emphysema in four cases which required on the average of from 10 to 16 days to disappear. In no case was there loss of the pneumothorax space.

Spontaneous pneumothorax should be regarded as a serious com-

plication In our series three cases developed this condition and despite repeated aspirations two of the cases died within one week

Loss of pneumothorax space occurred in five cases They were submitted later to thoracoplasty operation

Small amounts of fluid which remained stationary at the costo-phrenic angle or large amounts which covered the diaphragm but disappeared within two or three weeks after the operation, were not considered as complications especially in view of the fact that in most of these cases some fluid was present preoperatively

It has been our experience that pneumonolysis was not an important factor in the production of pleural effusion We maintain that purulent fluid and large serous effusions are less frequent following pneumonolysis than in unoperated pneumothoraces with adhesions Serous effusions were observed in 92 cases or 17.2 per cent

Tuberculous empyema complicating a pneumonolysis is undoubtedly due to trauma of some pleural or subpleural tuberculous foci In our series 64 patients or 11.6 per cent developed a purulent effusion

A mixed tuberculous empyema is a very serious complication and a fairly constant sequel to bronchopleural fistula resulting from injury to tuberculous lung tissue In our series this complication was encountered in 72 patients or 13.5 per cent

No cases of air-embolism, pleuro-cutaneous fistula, nerve injury or shock were encountered in our series (Table IV)

TABLE IV  
*Complications in Intrapleural Pneumonolysis*

	Cases	Per Cent
Total number of cases	533	
Intrapleural hemorrhage	3	0.06
Marked subcutaneous emphysema	4	0.08
Spontaneous pneumothorax	3	0.06
Loss of pneumothorax space	5	0.09
Serous effusion	92	17.2
Tuberculous empyema	64	11.6
Mixed tuberculous empyema	72	13.5
Cerebral embolism	0	0
Pleuro-cutaneous fistula	0	0
Nerve injury	0	0
Shock	0	0

Finally, all patients receiving pneumothorax, presenting adhesions should be given the benefit of a thorascopic examination and a pneumonolysis if possible. For it is not only useless but dangerous to continue an unsatisfactory pneumothorax. The information gained by an early thorascopic examination should be the deciding factor as to whether a pneumothorax should be continued or given up and another type of collapse therapy instituted.

### SUMMARY

1 From 1934 to 1944 inclusive, 612 patients at the Boston Sanatorium were submitted to thorascopy

2 In 533 patients a series of 605 pneumonolyses were performed. In 79 cases a pneumonolysis was not attempted because of the character of the adhesions.

3 The Coryllos thorascopie and galvanocautery was employed in every case.

4 The optimum time for pneumonolysis is 2 to 3 months following induction of pneumothorax.

5 Sputum conversion was effected in 63 per cent of the cases operated upon.

6 The operation is not without danger. The complications are enumerated.

7 Intrapleural pneumonolysis is a highly valuable operation in helping to bring about a satisfactory and effective collapse.

### RESUMEN

1 De 1934 a 1944 inclusive, se sometieron a la torascopia 612 enfermos del Sanatorio de Boston.

2 Se practicaron 605 neumonolisis en 533 enfermos. En 79 casos no se intentó la neumonolisis debido al carácter de las adherencias.

3 En todos los casos se empleó el torascopio y galvanocauterio de Coryllos.

4 El mejor tiempo para la neumonolisis es de 2 a 3 meses después de la iniciación del neumotórax.

5 Se efectuó la conversión del esputo en el 63 por ciento de los casos operados.

6 La operación no es exenta de peligro. Se enumeran las complicaciones.

7 La neumonolisis intrapleural es una operación muy valiosa para ayudar a obtener un colapso satisfactorio y eficaz.

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# Conservative Management of Hemothorax with Presentation of an Illustrative Case

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The diagnosis of hemothorax may be obvious in case of external injuries, or difficult to detect when concealed. Should the symptoms, physical examination and x-ray suggest a hemothorax, diagnostic aspiration is necessary for confirmation. Early shock is the rule. Anoxia also supervenes early. The shock is caused by local injury and hemorrhage. Early in shock, local pain and nervous factors are significant. Pallor, rapid, shallow breathing, small, rapid pulse, cyanosis, fall of blood pressure, and apathy appear in proportion to the amount and rapidity of the bleeding. With the loss of blood, there is a feeling of faintness, air hunger, rapid heart action, and coldness of the extremities. Blood volume, red blood count, and hemoglobin are reduced. At first the blood pressure is usually well maintained, but later falls. Cyanosis may not be evident, since it depends upon the grams of reduced hemoglobin present.

A sequence of events follows the accumulation of fluid or air in the pleural space. First, there is collapse of the lung on the side of the bleeding. The extent depends upon the presence of adhesions and of the amount of thickening of the pleura. Continuous bleeding builds up pressure, which is exerted against the mediastinum. Unless the mediastinum is firm, it readily shifts to the opposite side and partial collapse of that lung takes place. Local stasis results from pressure upon the great vessels and heart. Since the pulmonary system has a pressure one fifth that of the general circulation, control of bleeding from this source is easier, however, the constant movement of the lung may aggravate the bleeding. A vessel from the systemic circulation tends to bleed more violently because of its higher pressure. With increased intrapleural pressure, there is increasing dyspnea and cough, often with expiratory grunt.

It is known that with gross hemorrhage rales appear on the side opposite the bleeding. This transudation of fluid across the epithelial surface is the result of pressure upon the heart and great vessels, reduced oxygen supply to tissues, and dilution of the blood plasma with reduction in the osmotic pressure. The most significant physical signs associated with accumulation of blood are absent breath sounds and dullness to flatness on per-

cussion Bronchial breathing, bronchophony and pectoriloquy may be elicited posteriorly at the base, especially when clotting of the blood has taken place in this area A shift of the heart and mediastinum appears after considerable accumulation of fluid in the pleural space Signs of pneumothorax may be present above the level of the blood

Roentgenograms and fluoroscopy are valuable adjuncts in diagnosis Examination of the patient in the upright position usually gives more information concerning the amount of fluid present The contour of the bones should be observed for fractures Radio-opaque foreign bodies should be detected with fluoroscopy, shift of the heart and mediastinum should be noted, and paradoxical movement of the mediastinum and diaphragm should be observed Diagnostic aspiration of pleural fluid is usually necessary for confirmation This should be examined for color, specific gravity, hematocrit and cytology Bacteriological study includes culture and direct smear Organisms may be tested for penicillin resistance or susceptibility The hematocrit is of value in noting the percentage of red blood cells present Should a check-valve-type bronchopleural fistula be suspected, pneumothorax readings must be observed for rising pressures, so that a tentative diagnosis can be made With very rapid hemorrhages, the blood may compress the air in the pleural space and raise the intrapleural pressure

It is essential to discover infection early Many clinical findings are associated with hemothorax, which ordinarily would be diagnostic of infection Hemothorax frequently results in moderate elevation of temperature, chills and fever may occur with rapid bleeding, and the white blood count may be markedly elevated These findings are generally higher in infection than in hemothorax alone Laboratory examination of a small amount of pleural fluid frequently establishes the presence of infection

Airplane trips without special precautions can add to the anoxia already present because of the reduced oxygen tension at increasing altitudes, and the expansion of gasses present in the abdomen or chest

Emergency treatment is first directed toward stopping the hemorrhage Pressure upon open vessels usually cannot be done Under suitable conditions, ligation of the bleeding vessel may be necessary to prevent exsanguination Massive hemorrhages, such as may occur with ruptured aneurysm or severance of a major vessel, occur so rapidly that adequate medical aid cannot be given When a tear in the parietal pleura is so large that air enters and leaves the pleural space with each breath, adequate oxygenation of the blood in the lung is prevented The opening must be stopped immediately by any sterile or relatively sterile object present Fre-

quently a large towel serves the immediate purpose. Should paradoxical respiration occur with multiple rib fractures, fixation with adhesive strapping is essential to immobilize the injured area. After fixation, aspiration of the hemothorax and early use of oxygen is indicated.

Treatment depends upon the gravity of the symptoms. Most cases require only careful observation during the acute stage. Bleeding is generally self limited. With a small amount of bleeding, the patient can generally tolerate the symptoms. The bleeding vessel usually closes over with a blood clot that is firm in three to five days. Rest in bed, warmth, fluids and relief of pain delay or abort the onset of shock. Should symptoms progress, then guarded watching must be abandoned. Supportive treatment includes oxygen, fluids, and transfusion of plasma or blood. Oxygen is of great benefit in relieving the anoxia. It should be used early and with adequate pressure. Intravenous fluids, plasma and blood maintain blood volume. Blood is the most useful in controlling the effects of severe bleeding. Autotransfusions of blood may be given cautiously but fresh blood from donors is advisable. The speed with which the intravenous fluids are given depends upon the gravity of the situation. With the use of large amounts of fluid, the venous pressure should be checked and the lungs observed for increasing rales. The electrolytes will frequently increase edema and lead to further difficulty with respiration, while plasma and blood will often decrease the edema. Generally the patient is somewhat short of breath, and elevation of the foot of the bed only leads to further discomfort. Roentgenograms should be taken with a portable machine and repeated as often as are needed to indicate the progress of the effusion. Aspiration to relieve pressure symptoms may be dangerous in that the clot is dislodged by the changed intrapleural pressures and bleeding started anew. However, aspiration must be done when urgent pressure symptoms are present. It is probably better to aspirate all the air first and then, if necessary, the blood, at the rate of 200 to 300 cc as needed.

The amount of air to be maintained in the pleural space is an individual problem. Blood appears to be a better medium for exerting pressure against vessels than air, however, this is a debatable point. In many cases aspiration of the air is sufficient to control symptoms. Should infection be present, pneumothorax may keep the pleural surfaces apart and favor extension of the infection. If air is injected, it may form a space in the upper pleura, which is often quite difficult to obliterate completely. However, there are many factors in favor of the use of pneumothorax. If the blood is aspirated and air replacement done, smaller amounts of blood will remain for absorption. This could well result in more

rapid expansion of the lung with less fibrotic encasement. If there is a lesion in the lung that will be benefited by the pneumothorax, fluid should be drained and air injected as frequently as necessary. Immediate attention must be given a tension pneumothorax, complicating hemothorax. Air is removed as necessary to relieve symptoms. If two aspirations fail, then the use of closed continuous drainage with water seal is advisable. When there is evidence that the fistula has closed, the needle should be withdrawn. Tension pneumothorax is often accompanied by infection, which requires surgical intervention.

Early prevention of infection is more desirable than later treatment of this complication. Should there be reason to suspect infection, penicillin is immediately started systemically or locally. Sulfa drugs may be used, but penicillin usually is more desirable. Both drugs diffuse into the pleural fluid, but penicillin is effective in the presence of pus. The organisms present in the pleural fluid generally are those of the gram-positive group of streptococci, staphylococci and pneumococci which usually are penicillin susceptible. Some believe that foreign bodies should be removed before infection supervenes, or else left until four or six weeks later, when the infection has quieted or has been controlled.

When the acute phase has subsided, the blood in the pleural space is removed. Blood here tends to remain fluid to a great extent for a period of about three to five days. At this time evacuation must be considered. Usually about 300 cc may be removed daily with little discomfort to the patient. Sterile technique is essential since blood is generally considered a favorable medium for bacterial growth. With the removal of the blood, there will be shortened time for lung re-expansion and a decreased period of convalescence. The less material left in the pleural space, the less likelihood of a greatly thickened pleura resulting. Should blood reform for long periods, it must be removed as it collects. After the blood is removed, fibrin still clings to the pleural wall. A small amount of blood clot will probably remain. This usually absorbs without difficulty. If a considerable amount of blood clot is present and thick fibrin forms, decortication in four to six weeks may be advisable. This frequently prevents the so-called "thoracic cripple," who has dense scar tissue, retraction of the structures on the side of the scar tissue, decreased expansibility of the lung and frequent pains of varying severity.

Most of our cases have been treated only with careful observation and the results have been quite satisfactory. However, the following illustrates the case in which many maneuvers were necessary to control the acute episode.

## CASE REPORT

Miss R.M.D., age 22, received right pneumothorax because of a soft infiltrative lesion in the midportion of the right lung. After thirty days of small refills with air, a selective collapse was present over the lesion. Adhesions at the apex and base were to have been investigated later with a thoracoscope. Blood count relatively normal. Sputum positive.

About eight hours after a refill of 350 cc of air given without difficulty, and with a final pressure of  $-1\frac{1}{2}$   $-2$ , the patient complained of slight pain and shortness of breath. Fluoroscopy showed a small amount of fluid in the costo-phrenic angle. Twelve hours later, she noticed some increase in the shortness of breath, discomfort on lying down and increasing pain at the base of her right lung. The temperature was 99, pulse 92, respiration 20. There was some increase of the fluid to a level just covering the diaphragmatic leaf, with no shift of the mediastinum. Since shortness of breath and anxiety were out of all proportion to the findings, 250 cc of air were withdrawn with an initial pressure of  $-2$   $-4$  and a final pressure of  $-2$   $-5$ . Some relief of symptoms were immediately noticed. The blood pressure was 110/70.

While conservative therapy was continued, the pulse slowly rose to 110 and respirations increased. She did quite well for the next twelve hours when alarming symptoms developed about a half hour following a bowel movement. The radial pulse could not be detected, and respirations were sixty per minute and shallow. The patient was pale, the blood pressure dropped to 82/60, and the heart rate rose to 160. Three-hundred cc of air were withdrawn with some relief. The initial pressure was plus 2  $-3$  and the final  $-4$   $-9$ . One-hundred per cent oxygen inhalation was started. Fluids were given by vein until plasma could be obtained. The cough was slight. Prophylactic use of penicillin was started because the increasing intrapleural pressures suggested bronchopleural fistula, and because the white blood count rose to 25,000. Fifty thousand units of penicillin were placed in the pleural space and 15,000 units were given intramuscularly every three hours. Over the course of treatment 540,000 units were used. Roentgenograms showed increasing fluid. Rales were present at the left base (the side opposite the hemothorax), which had not been there twenty-four hours before. Physical signs in the lower half of the right lung were interesting in that whispered pectoriloquy, bronchophony, bronchial breathing and flatness were present. Above this were the signs of pneumothorax.

A blood count at this time revealed W.B.C. 25,250, R.B.C. 2,950,000, with a hemoglobin of 8.5 grams. Pleural fluid showed a hematocrit of 34 per cent, R.B.C. 3,570,000, W.B.C. 15,700, Hemoglobin of 10 grams, Polymorphonuclears 79 per cent (26 per cent "Stab"), lymphocytes 15 per cent, monocytes 4 per cent and eosinophiles 2 per cent, red blood cells well formed, platelets absent. The red cell count of the pleural fluid was actually higher than that of the peripheral blood. Repeated cultures of the bloody pleural fluid on aerobic media, anaerobic media, and media for tuberculosis, showed no growth.

Following the glucose saline infusions, the pulse rate fell to 140. Respirations decreased to 34 but were somewhat labored. The rales at the left base increased, however, the venous pressure was not increased. Plasma was substituted. After 500 cc of plasma, the patient felt much better even though the pulse was 148 and respiration 42. All the air was now withdrawn from the right side. Three blood transfusions of



300 cc, 500 cc and 500 cc were given over the next twelve hours with marked relief Temperature was 100, pulse 120, respirations 56 blood pressure 110/80 The rales present on the left side became considerably less

Following this, the patient gradually developed signs of increasing intrapleural pressure, namely, a tickling cough and progressively increasing respiratory grunt With this, rales again appeared on the left side Increased oxygen pressures were tried but gave no relief Blood pressure mounted to 140/90 Roentgenograms showed marked increase of the fluid on the right side, with considerable shift of the heart and mediastinum to the left At this time the blood count was 65,000 white cells, 4,100,000 red cells, 10.6 grams hemoglobin, and repetition of this count in 12 hours gave essentially the same values

Because of increasing pressure symptoms, 650 cc of blood were slowly removed from the right side After the blood was removed, the patient felt much more comfortable Breathing became normal and the left side rales slowly disappeared Temperature was 101.2, pulse 128, respiration 32 Whispered pectoriloquy, bronchophony, bronchial breathing and flatness to percussion were present over the entire right side Calories, protein, fluids and electrolytes were maintained by mouth

The patient improved steadily Starting four days later, 200 cc of blood were withdrawn each day A total of about 1,000 cc were removed when a dry tap was secured Pneumothorax was attempted, but small amounts of air caused rapid pressure changes, so it was abandoned The blood count at this time was W.B.C 18,700, R.B.C 4,000,000, hemoglobin 12 grams, and remained unchanged for three weeks At the end of three weeks, roentgenograms showed haziness of the right side with a small amount of pneumothorax present laterally Temperatures varied from normal to 101, pulse 92, respiration 20

After five weeks, breath sounds were present on the right side, with slight pectoriloquy and dullness still present at the base posteriorly Scattered, fine pleural rales were noted over the right side Coarse rales were heard at the hilus The patient's general condition was good and her nutrition well maintained Roentgenograms showed evidence of considerable expansion of the lung and less haziness of the pleural space The blood count returned to the level found on admission After four months the lung is almost re-expanded, the tuberculous lesion markedly cleared, the sputum negative and the patient doing well in general

## DISCUSSION

A case of pneumothorax complicated by hemothorax is presented, in which numerous maneuvers were necessary to meet the altered conditions taking place in the chest First conservative treatment was tried but failed Penicillin was given locally and systemically to control possible infection Anemia due to blood loss was combated by replacement of plasma and blood The rapid onset of shock was met by analgesics, warmth and fluid by vein Pressure symptoms required frequent aspiration of air and blood in order to keep the intrapleural changes at a minimum Oxygen was administered to relieve the anoxia caused by the diminished hemoglobin, pressure on the vital mediastinal structures, diminished lung

volume, and edema of the lung After the acute symptoms had been treated, blood was aspirated from the pleural space to the greatest extent possible The lung slowly re-expanded, with breath sounds appearing on physical examination and roentgenograms showing evidence of re-expansion and clearing

Infection was never proven The rising intrapleural pressures made a tentative diagnosis of bronchopleural fistula valid However, the increasing pressures may have been due to the compression of the air in the pleural space by the brisk bleeding The extremely elevated white blood count suggested infection, but could have been secondary to the hemorrhage, or possibly the blood transfusion Penicillin was used as a prophylactic until the laboratory results could be evaluated Repeated cultures were negative

At one time during the acute hemorrhage into the pleural space, the hematocrit and blood count of the hemothorax was actually greater than that of the blood in the veins A likely explanation of this is that the bleeding had taken place into the pleural space when the blood had a high red cellular content This red blood corpuscle value was reduced when the body fluids were pulled into the blood stream in an attempt to maintain the blood volume and blood pressure

### CONCLUSION

1 Physiological changes in the intrapleural space with hemothorax must be treated individually and met promptly, if best results are to be secured

2 Conservative treatment usually suffices in hemothorax, but if symptoms increase, energetic treatment of the shock, anemia, edema and increased pressure are necessary

3 The use or continuation of pneumothorax depends upon the individual case, but in general, aspiration of the air alone relieves symptoms

4 Blood should be aspirated to the fullest extent possible after a firm clot is present in the bleeding area This permits rapid expansion of the lung with maximum return of lung function

### CONCLUSION

1 Las alteraciones fisiológicas intrapleurales ocasionadas por el hemotórax deben ser tratadas individualmente y debe hacerseles frente sin tardanza para que se obtengan los mejores resultados

2 En casos de hemotórax el tratamiento conservador suele ser suficiente, pero si acrecentan los síntomas es necesario tratar enérgicamente el choque, la anemia, el edema y la hiperpresión

3 El empleo o la continuación del neumotórax depende del caso

individual, pero, en general, la aspiración del aire alivia los síntomas

4 Después de que se haya formado un coágulo firme en la parte sangrante debe aspirarse la sangre tan completamente como sea posible. Esto permite la rápida expansión del pulmón y la restitución máxima de la función pulmonar

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## Editorial

### COMMUNITY TUBERCULOSIS CONTROL

When we consider tuberculosis control or eradication for an entire nation, we must think of the part to be played by each community. In some places more logical programs are developed than in others. The citizens are willing to spend more time, effort, and money, and therefore they advance much faster than those of other communities. Thus for a time there is unequal accomplishment in the various communities, and therefore it is not until all communities attain the goal that the nation itself has controlled or eradicated the disease. An excellent example is that of tuberculosis control among the cattle of the United States. Although a national program was launched in 1917 and a few counties received the modified accredited rating in 1923, it was not until 1940 that all counties merited this classification, and therefore the entire nation was designated a modified accredited area. Now the final goal—eradication—has been attained in some areas while others are lagging, and therefore eradication for the entire nation cannot be announced until every county has eradicated tuberculosis from the cattle herds.

Workers in human tuberculosis are trailing far behind the veterinarians. Nevertheless with certain modifications of program they are following the same pattern. In some communities where the leaders have had a clear vision of tuberculosis control and the citizens have worked long and arduously, the disease is rapidly coming under control and the workers have already set eradication as their goal.

Among the 92 cities of the United States with 100,000 population or more, Grand Rapids, Michigan, is leading in the tuberculosis control program. In 1905 the mortality rate was 103, and in 1929 it was 52.9 per 100,000 population. In 1944 the mortality rate in this city of 165,000 population had been reduced to 15.9 per 100,000. In 1929, 25 per cent of high school students reacted to tuberculin, but in 1946 this percentage was only 8. This was not due to chance or luck but to a well organized program which has been in effect for many years.

In this issue of *Diseases of the Chest*, Sherwood briefly describes the activities that have led to this accomplishment. In a few sentences he casts aside such unimportant factors as race and nationality of the people, slum areas and large industries and proceeds to the tubercle bacillus as the cause of tuberculosis. Attention is called to the official health department, sanatorium staff, medical

society, anti-tuberculosis society, community health service, and certain state organizations working almost as a unit. No group has attempted to monopolize the program and none has tried to destroy another. Instead of fighting one another, the workers have fought the tubercle bacillus. Fundamentals in tuberculosis control have been used in every step. A sanatorium was provided so contagious cases could be removed from their homes. In 1920, only 14 of the 119 deaths occurred in the sanatorium, whereas in 1944, only 7 persons died outside the sanatorium.

The extreme value of the tuberculin test as a case-finder and as an educational agent was early recognized and is administered to children and adults alike. The necessity of periodic x-ray inspection of the chests of all adult tuberculin reactors was fully appreciated and was employed to the limit of available facilities. Complete examination, including laboratory facilities for both pulmonary and extrathoracic tuberculosis is in practice.

Persons who have overcome clinical tuberculosis are re-examined periodically and a good rehabilitation program is being developed. Best of all, the citizens of Grand Rapids are not satisfied with this splendid accomplishment in tuberculosis control. Eradication is their goal! The remaining 91 cities with populations of 100,000 or more as well as smaller municipalities could profit by careful study and application of the Grand Rapids program.

J A M

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# "Information Please in Medicine"

*As Presented at the Twelfth Annual Meeting of the  
AMERICAN COLLEGE OF CHEST PHYSICIANS*

*San Francisco, California*

JUNE 29 1947

Carl H Gellenthien M.D F C C P , Moderator  
Valmora New Mexico

## Panel of Experts

### *Medicine*

James J Waring M.D , Denver, Colorado

### *Pathology*

Emil Bogen, M.D , Olive View, California

### *Bronchoscopy*

Paul C Samson, M.D F C C P Oakland, California

### *Surgery*

Alton Ochsner, M.D , F C C P New Orleans, Louisiana

### *Roenitgenology*

Russell H Morgan, M.D , Baltimore, Maryland

**Question** What do you think of the penicillin inhalation treatment of bronchiectasis?

**Answer** (Dr Waring) I think the penicillin inhalation treatment of bronchiectasis is helpful. It will not cure the irreversible damage to the bronchi, but it will reduce the quantity of the sputum frequently stop the foul odor and improve constitutional symptoms. Penicillin inhalations are sometimes irritating to the mouth and throat, but in my experience these side reactions have so far not been sufficiently serious to justify stopping the treatment except in a very few cases. I think the penicillin inhalation gets the patient in better shape for operation. In a word, penicillin inhalation treatment is palliative, sometimes has to be supplemented by intramuscular penicillin. Surgery, that is, lobectomy, is the best cure.

**Question** How are the dynamics of circulation affected by extensive thoracoplasty, and what is the clinical significance of hypertension with the development of hypertensive symptoms?

**Answer** (Dr Ochsner) The dynamics of the systemic circulation are not affected by extensive thoracoplasty. It has been shown, however, that thoracoplasty and other collapse procedures cause a shunt of the blood out of the collapsed lung into the opposite side. This does not affect the systemic circulation, however. Hypertension is of no significance in a patient who is to undergo thoracoplasty with one exception and that is the individual who has myocardial damage as a result of the hypertension may not be able to withstand a thoracoplasty safely, but hypertension per se is no contraindication and does not influence the indications for thoracoplasty.

*Question* Does a tuberculoma represent an active or a healed tuberculous process?

*Answer* (Dr Bogen) A tuberculoma may be active, healed, or latent, as it is difficult from x-ray or clinical data in many cases to tell just what the condition is. Many of the solitary, round shadows in the lung regarded as tuberculomas by roentgenologists really represent blocked cavities which may re-open if the obstruction to the bronchus is removed.

*Question* What effect does penicillin inhalation have on hemoptyses from severe bronchiectases and lung abscess patients?

*Answer* (Dr Warling) Penicillin inhalations will not cure the irreversible damage of bronchiectasis and chronic lung abscess. Surgery is the best cure for severe bronchiectasis and chronic lung abscess and therefore is the best treatment for hemoptyses in these conditions.

*Question* Which is the best treatment of adenoma of the bronchus? Bronchoscopic? Pulmonary resection?

*Answer* (Dr Samson) In general, the best treatment of the adenoma of the bronchus consists of pulmonary resection of sufficient degree to remove the tumor completely. While it is true that in the past there have been scattered reports of bronchoscopic "cure" of adenomas, this has not happened with sufficient regularity to warrant optimism as a usual means of treatment. Bronchoscopy is, of course, of inestimable value in establishing diagnosis through gross inspection of the tumor and biopsy, and is also of great aid in shrinking or at least removing sufficient amount of the local tumor so that infected secretions dammed up beyond the obstruction may be drained out. This adds considerably to the patient's comfort and, when operation is anticipated, it will make the operation considerably safer. Many of these tumors are somewhat like icebergs in that the endobronchial portion is considerably smaller than the extrabronchial portion and while some amelioration may be gained by treating these lesions locally through the bronchoscope, cure is another matter. Only resection can safely remove an adenoma. In speaking a word about resection, my personal belief is that no tumor should be left behind. We are ill-advised to do resections of one or two lobes and cut through tumor in attempting to close the bronchus. Since there are an increasing number of reports of at least local metastases from adenomas we must consider that they have a certain malignant potential although it may be very small. Since this is the case I believe it much safer to do a pneumonectomy if necessary in order to remove all the tumor.

*Question* What surgical treatment, if any, do you advise for a tuberculous cavity in basal division of a lower lobe with x-ray signs of old apical contralateral infection?

*Answer* (Dr Ochsner) I should prefer doing a phrenicectomy as a preliminary procedure to be followed probably by an artificial pneumoperitoneum, particularly in the individual who has a contralateral infection, although generally the contralateral infection is not of great importance. If the phrenicectomy followed by pneumoperitoneum did not bring about a collapse of the cavity, I would suggest a lobectomy. There are many who believe that a lobectomy is the procedure of choice in such an instance, but it seems to me that a phrenicectomy and artificial pneumoperitoneum would be better as a preliminary procedure. One can always resort to a lobectomy later.

*Question* Do you consider a 35 mm, 70 mm, or 4" x 5" photofluorogram

an adequate x-ray examination, initially, for nearly all contacts of known tuberculous persons?

*Answer* (Dr Morgan) Yes All of the photofluorographic films of today are entirely satisfactory for the detection of pulmonary tuberculosis

*Question* In treating a massive pleural effusion is it advisable to remove the fluid by repeated thoracenteses of a few hundred cc at a time or to attempt to remove the entire effusion at once? Should air be instilled?

*Answer* (Dr Waring) The treatment of massive pleural effusion should be repeated complete aspiration if the patient is dyspneic or shows circulatory disturbance or has much fever In many instances fluid is best left alone, since it will spontaneously absorb I would not replace the fluid with air under any circumstances I assume we are dealing with a tuberculous pleural effusion

*Question* Do you believe bronchial adenoma is a malignant or non-malignant tumor and why?

*Answer* (Dr Bogen) Bronchial adenoma is ordinarily histologically benign, and pathologically gives little evidence of tendency to invasion or metastasis, although clinically it may be extremely disastrous to the patient, as a result of bronchial occlusion and secondary infection However, bronchial adenomas may be multiple and rarely show evidence of malignant characteristics

*Question* What are the indications for primary thoracoplasty?

*Answer* (Dr Ochsner) A large cavity at the apex is an indication for primary thoracoplasty In this instance there are likely to be rather broad adhesions between the lung and the parietes, obviating collapse by pneumothorax, and even if collapse by pneumothorax were possible the large cavity would be better treated by a localized thoracoplasty because one could not expect to get much restitution of function of that part of the lung, if any at all

*Question* Do you use tuberculin? If so, do you use it for any cases of pulmonary tuberculosis?

*Answer* (Dr Waring) I do not use tuberculin in treatment but only for diagnosis

*Question* When pneumothorax is indicated, what bronchoscopic findings would, in your opinion, cancel or contraindicate pneumothorax?

*Answer* (Dr Samson) We believe that pneumothorax should either be discontinued or is contraindicated when bronchoscopically we find acute chronic ulcerative, granulomatous or ulcero-stenotic lesions in either the bronchi or trachea In the presence of bronchial disease of this nature there is a very high degree of probability that atelectasis either lobar or total will develop as the result of pneumothorax Once developed, partial or total pulmonary collapse of this nature is very often irreversible In addition, the dangers of empyema are heightened by the persisting pleural space which cannot be obliterated by expansion of the lung A nonulcerative nonstenotic tracheo bronchitis, particularly if it is not acute, should not contraindicate pneumothorax if the patient is observed very carefully The same applies to a rather limited group of healed stenoses which are local in extent and which have no inflammatory reaction about them If the bronchial opening is greater than 5 or 7 mm in diameter and without any reaction, it is probable that a carefully watched pneumothorax is without undue hazard



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*Question* What is your opinion about the abusive use of calcium salts by injections in the treatment of pulmonary tuberculosis?

*Answer* (Dr Waring) Calcium salts are said to be helpful sometimes in preventing the recurrence of pleural effusion and are thought to be helpful in hastening the absorption of pleural effusion. In both instances the injection of calcium salts is not repeated many times. I have had no experience with "the abusive use of calcium salts."

*Question* How do you confirm your diagnosis of sarcoid?

*Answer* (Dr Morgan) The typical roentgenographic findings of sarcoid include masses of enlarged glands adjacent to the hilar areas of the lungs. In addition, there may be linear markings extending throughout both lung fields and frequently there may be small dehiscences within the bases of the phalanges of the hands. The finding of these changes within an individual, of course, does not constitute proof that the individual is suffering from sarcoid disease, such proof depends upon the microscopic changes that are observed by the pathologist.

*Question* What is the status of pulmonary decortication in treating unexpandable tuberculous lungs?

*Answer* (Dr Ochsner) This surgical procedure is still in the experimental stage and although the number of cases in which it has been done are few, there are very definite possibilities for it. Until recently, it was the consensus of most thoracic surgeons that thoracoplasty was the only procedure in patients with a very thick pleural rind, prohibiting the re-expansion of the lung. It has been astounding with what ease, however, decortication has been possible, and it is likely that in the future this procedure will be used much more frequently than it has in the past.

*Question* How does the presence of a bronchial tuberculosis or tuberculous bronchitis affect the indications for collapse therapy?

*Answer* (Dr Samson) This question can be partially answered by referring to the remarks on pneumothorax above. In my opinion, an acute ulcerative tracheobronchitis contraindicates collapse therapy of any sort. At most, a phrenic nerve interruption or pneumoperitoneum might be established. The latter should certainly be established carefully and the lung watched very carefully for signs of atelectasis. Dr Trimble tells me that in his series of pneumoperitoneum cases the results in patients with complicating tracheobronchitis were much poorer than if the bronchial disease was not present. However, he did not feel that tracheobronchitis definitely contraindicated pneumoperitoneum. I believe that in acute ulcerative or granulo-ulcerative lesions attempt should be made to reduce the granulations by careful removal of the granulation tissues, curettage, and application of either 25 per cent silver nitrate or high frequency electrocautery. These measures are carried out in an attempt to keep the bronchus as open as possible and to promote healing. Recent studies on the effects of promine and streptomycin given by the aerosol technic indicate that tracheobronchial lesions may respond very well to this treatment. If this proves to be so with further study, it may mean that frequent bronchoscopy and local treatment may not be as necessary as they have been in the past. As the acute ulcerative process calms down with or without the development of stenoses it is possible that thoracoplasty can be performed with relative safety. There have been several articles by John Alexander, O'Brien and others on this subject. My personal experience indicates that if the presence of the stenoses

is known and proper precautions in the way of postoperative bronchoscopy are undertaken, a stenosis does not necessarily contraindicate thoracoplasty. The question of resection must always be decided in these cases. In my opinion, a resection is indicated if, because of the stenosis there is definite secondary suppuration in the lung beyond the stenosis. In cases of this sort thoracoplasty gives poor results. Lobectomy or pneumonectomy is then indicated depending on how much of the lung may be involved. The so-called hyperplastic or nonulcerative nonstenotic type of tuberculous bronchitis usually is not a contraindication to whatever type of collapse may be necessary for the pulmonary lesions.

*Question* Is hyperthyroidism ever associated with active tuberculosis? Why the rarity of this association?

*Answer* (Dr Bogen) Active tuberculosis does not provide absolute safeguard against the development of hyperthyroidism, although the association is by no means common. There is a little experimental work suggesting that hypothyroidism at least may lessen resistance to tuberculosis, but the exact mechanism has not been elucidated, since tuberculosis of the thyroid gland itself is extremely rare. The mechanism of this incompatibility has not been worked out.

*Question* Do you have any general rules for terminating pneumothorax? What is your opinion of continuing pneumothorax over prolonged periods—say 8 to 10 years?

*Answer* (Dr Waring) It is hard to give a general rule for the termination of artificial pneumothorax. If the patient has become sputum negative and is clinically well and on a reasonable amount of exercise and the collapse has been fairly complete, I would stop the pneumothorax somewhere between two and three years after the sputum has become negative. Much will depend upon the condition of the lung before pneumothorax was started. I am not in favor of continuing partial pneumothorax except under conditions that demonstrate adequately that a partial collapse is really collapse of a diseased lobe. If pneumothorax has been continued eight to ten years, it is highly probable that the lung will not re-expand after pneumothorax has been stopped.

*Question* Which is more important for a chest surgeon, a training in general surgery or a training of equivalent time in clinical and x-ray aspects of chest diseases and bronchoscopy?

*Answer* (Dr Ochsner) As far as surgery is concerned, there is no equivalent for training in general surgery. Unless a chest surgeon is well grounded in the fundamental principles of general surgery, he is not able to treat patients who have thoracic problems. This is true not only of chest surgeons, but is also true of other surgeons as well. Whereas it is important for a man treating patients with chest diseases surgically to have experience in clinical and x-ray aspects of chest diseases and bronchoscopy, this training however, does not prepare him for doing major surgery within the chest.

*Question* In 40 cases of congenital cystic emphysema of the lung, followed for 15 years, 7 died of bronchial carcinoma. Could this be coincidence?

*Answer* (Dr Bogen) In view of the increasing frequency of bronchial carcinoma, an incident of 18 per cent, although high, might still be merely the result of coincidence and not be confirmed in a larger series. On the other hand, the metaplasia sometimes found in association with cystic emphysema suggests that some carcinogenic compound may be

associated with this condition or that retention of pulmonary secretion or the retention of mammary or prostatic secretions may predispose to malignancy. More information is required before we can draw conclusions in this regard.

*Question* Can bronchoscopy be better done by a person with clinical and x-ray training in chest diseases or not? And why?

*Answer* (Dr. Samson) I cannot answer this question without some qualifying statements. It should be emphasized that endoscopy is a highly technical procedure and as such, thorough training in the actual technic of passing either a bronchoscope or an esophagoscope is essential. This is certainly true whether one's background is otolaryngology, medicine, or surgery. Once having learned some of the fundamentals of the gross appearance of the tracheobronchial tree or esophagus, it seems to me that there is little question but what the man whose background consists of medical or surgical thoracic training is much better qualified to interpret endoscopic findings than one who has not had such a training. No man whose prior training has been essentially confined to otolaryngology can hope to remain on a par, endoscopically speaking, with one whose training has been primarily in thoracic disease, unless the otolaryngologist spends much time and study on diseases of the chest and has the opportunity of correlating that knowledge with many endoscopic examinations.

*Question* If the primary infection is caused by the bovine bacillus, is the human type capable of causing the reinfection?

*Answer* (Dr. Bogen) Certainly, this is true. Griffiths in England and Jensen in Scandinavia have demonstrated instances of human-type tubercle bacilli obtained from sputa of patients from whom bovine types of bacilli have previously been obtained, from gland or other lesions. Lurie Murray has also demonstrated the superimposition of one type on another in experimental work in animals.

*Question* Please discuss the causes of the edema often seen in patients dying of pulmonary tuberculosis.

*Answer* (Dr. Waring) The edema in patients dying of pulmonary tuberculosis is probably due to one or more of the following: 1) severe malnutrition, 2) severe hypoproteinemia, 3) amyloid disease of the kidney, 4) nephritis, 5) nephrosis.

*Question* Discuss the management of a moderate sized pleural effusion that is asymptomatic in the course of induced pneumothorax in pulmonary tuberculosis.

*Answer* (Dr. Ochsner) Repeated aspirations of the pleural fluid with replacement of air.

*Question* How do you establish the cause for repeated hemoptysis in a patient with negative x-ray films of the chest?

*Answer* (Dr. Samson) The cause may be very easy or very difficult to establish. I presume that Dr. Adams means by negative x-ray films of the chest, the ordinary studies such as frontal and lateral views and fluoroscopy have been carried out. Further studies which occur to me would be, of course, bronchoscopic examination, careful bronchograms of the lungs done preferably at two sittings, and, probably tomograms of the chest. It occasionally happens that tumors, either adenomas or carcinomas, which are not large enough to obstruct completely a bronchus and therefore show no evidence of their presence on ordinary x-rays, can be the source of bleeding of this type. Minor degrees of bron-

chiectasis, particularly that hidden behind the heart, can be a source of repeated hemorrhage with a normal or relatively normal x-ray. In very rare instances tuberculous bronchitis has been described as a primary disease without evidence of pulmonary tuberculosis and this can be a source of bleeding though it is difficult if not impossible to uncover. I have bronchoscoped two or three of these people during the time that they are bleeding and there appeared to be almost a dyscrasia of the tracheobronchial mucosa in which many bleeding points could be seen without obvious cause. The treatment of this latter group is very unsatisfactory and at the present time I have not discovered a reasonable or logical explanation for such bleeding.

*Question* Discuss the value of x-ray therapy in gland and pulmonary tuberculosis.

*Answer* (Dr Morgan) X-ray therapy has been widely used in the treatment of lymphadenitis of the neck. By and large, the results are favorable. The glandular enlargement diminishes within a short time after the administration of the therapy in most cases. In other cases, the extent of the pathology is sufficiently localized to permit satisfactory surgical intervention. In a few cases x-ray therapy has no effect whatsoever. Fortunately, cervical lymphadenitis has become a rather rare disease since pasteurization of milk has been instituted. X-ray therapy has no place in the treatment of pulmonary tuberculosis.

*Question* To what extent should bed-rest in pulmonary tuberculosis be carried out?

*Answer* (Dr Waring) Bed-rest is important during the active, acute stages of pulmonary tuberculosis. Bed-rest must be individualized. No general rules can be given for its use. I have frequently kept the patient in bed until the sputum became negative, even if this took a couple of years. Rigid bed-rest is imperative during the early stages of the acute process when the patient has fever. Later, bathroom privileges are permitted. I doubt very much if pulmonary embolism and thrombophlebitis are frequent in the young patients kept at prolonged bed-rest. In older patients one must bear in mind the possibility of thrombophlebitis and pulmonary embolism.

*Question* Is the active progressive tuberculosis acquired in tuberculin positive children after BCG vaccination a primary phase or reinfection type?

*Answer* (Dr Bogen) Tuberculosis developing soon after vaccination with BCG probably as a result of infection acquired before BCG may manifest primary phase characteristics such as lymphoid adenopathy and later calcification. Infection acquired after the BCG vaccination, however, is practically always of reinfection type without glandular adenopathy and with little tendency to calcification.

*Question* Is there any method of determining pre-operatively the expansibility of a lobe one wishes to leave in following lobectomy? Would like to cite a case in which left lobe and lingula were removed and although upper lobe appeared normal, the anesthetist was unable to re-expand it by positive pressure, though it appeared well aerated. Post-operatively the upper lobe failed to re-expand with suction drainage and the patient subsequently developed an empyema which had to be obliterated by a basal thoracoplasty.

*Answer* (Dr Samson) The only determination of which I know pre-operatively would be bronchoscopy to see whether the bronchial orifice

was patent, careful lipiodol bronchograms to determine evidence of bronchial pathology in the lobe, and the appearance of the lobe by usual x-ray projections and fluoroscopy. In the case cited in the question I can only suggest a possible answer. A lobe which appears normal when the chest is opened and which collapses during operation should be re-expandable. If this is not possible during operation when the anesthetist exerts a positive pressure, I believe it is almost certain the bronchial orifice has become occluded by heavy secretions which probably have been squeezed out of the diseased lobe during operation. I, myself, have proved this to be true on one or two occasions when, at the end of operation, the anesthetist was unable to re-expand a remaining lobe following lobectomy. On these occasions I have immediately bronchoscoped the patient before closing the chest and have been able to aspirate tenacious purulent sputum which was plugging and obstructing the lobar bronchus. Following this maneuver, positive pressure resulted in prompt re-expansion of the remaining lobe. This is an extremely important point because if the lobe does not expand an empyema is almost inevitable with a resultant situation which is probably more serious for the patient than if the entire lung had been removed at operation. In such a case bronchoscopy is not only advisable but mandatory before the chest is closed to be sure that bronchial obstruction is not present. Suction drainage with high negative pressure does not answer the problem since, if the lobe cannot be pushed out by positive pressure neither can it be pulled out by high negative suction when the bronchus is occluded. It is our custom routinely to bronchoscope all patients immediately after operation on whom major resection has been done. We believe that such a procedure removes offending secretions before they have a chance to obstruct other portions of the remaining lobe or of the opposite lung and is an important factor in reducing post-operative morbidity from atelectasis, pneumonitis, bronchial fistula, and empyema.

**Question** When is a tuberculous patient considered as completely cured?

**Answer** (Dr. Waring) A tuberculous patient may be considered completely cured when he has been without symptoms and with a negative sputum under ordinary conditions of life for at least five years. Pulmonary tuberculosis is prone to relapse even after many years of freedom from symptoms. To answer the question would require definition of the word "cure."

**Question** In a case of tracheobronchial tuberculosis with partial obstruction of left main bronchus with visible obstruction near carina would you advise a thoracoplasty or a pneumonectomy?

**Answer** (Dr. Ochsner) Unless the obstruction was fairly high grade, interfering with the expulsion of secretions from the lung, I would prefer thoracoplasty as a preliminary procedure, explaining to the patient and family that possibly a pneumonectomy might have to be done later. Many of these patients, following the collapse obtained by thoracoplasty will require no further therapy. In the individual who is not sufficiently improved, pneumonectomy can be done at a subsequent time.

**Question** Discuss diagnosis and management of a patient with pulmonary tuberculosis and cor pulmonale.

**Answer** (Dr. Waring) I would base the diagnosis of cor pulmonale in a patient with chronic pulmonary tuberculosis upon the signs of right ventricular enlargement and strain. The treatment is very difficult, since

It is not possible to reverse the causes of his pulmonary hypertension which are 1) severe fibrothorax, 2) massive pleural adhesions, 3) severe wide-spread pulmonary fibrosis, 4) emphysema I try to anticipate his right heart strain and get my patient out of the high altitude and down to sea level, and limit his activities

*Question* What are the indications and contraindications for lung resection in tuberculosis as you see them?

*Answer* (Dr Ochsner) We have taken a very conservative attitude concerning pulmonary resection for tuberculosis. One definite indication is high grade bronchial stenosis, which is a mechanical lesion the result of the tuberculosis, and the resection is done because of the mechanical defect rather than the tuberculous process itself. Another indication is the persistence of positive sputum after satisfactory thoracoplasty. Although the number of cases is small, it is still a definite indication. Tuberculomas are also indications for resection. Many times a tuberculous lobe is resected under the mistaken diagnosis of neoplasm and the lesion is proved microscopically to be tuberculoma. Although many are of the opinion that in basal cavities lobectomy should be done we have felt that lobectomy should be reserved for the patient who does not respond to phrenicectomy and artificial pneumoperitoneum.

*Question* What importance do you place on the occasional positive sputum in the clinically well patient?

*Answer* (Dr Waring) I am not sure I understand the question, but the presence of tubercle bacilli in the sputum is always cause for anxiety since 1) It is a menace to the friends and relatives of the patient even though he appears to be clinically well, and 2) It may indicate a small ulcer in the bronchus that is continuing to shed tubercle bacilli. I must admit that tubercle bacilli have been found in the sputum recovered from the stomach in conditions which would indicate that the patient was in excellent condition, able to resume a normal life or actually leading a normal life. In conclusion, one must not view presence of tubercle bacilli under these circumstances with complacency. The patient must be kept under observation.

*Question* Do you think that pseudobronchiectasis is a valid designation for those cases in which reversible dilatations of bronchi occur?

*Answer* (Dr Ochsner) I do not like the designation "pseudobronchiectasis," because the individual who has dilatation of the bronchi has bronchiectasis and not pseudobronchiectasis. I much prefer the term "functional bronchiectasis," because I believe as a result of infection of the bronchi, functional dilatation of the bronchi can occur. The process is reversible, because following control of the infection the dilatation disappears. It is only after destruction of the elastic tissue and bronchial musculature and replacement by scar tissue that the anatomic change so characteristic of bronchiectasis is seen.

*Question* Please comment on reports of Dr Dubos' findings.

*Answer* (Dr Bogen) Dubos has unquestionably made a great contribution to the study of the bacteriology of the tubercle bacillus, although the practical application of his findings is not yet readily evaluated. Rene J. Dubos (author of "The Bacterial Cell" and discoverer of the first antibiotic agent to be isolated, in a pure state—that against the pneumococcus—which thus paved the way for the discovery of penicillin and streptomycin) in April of 1945 described remarkable rapid growth of tubercle bacilli under the surface of fluid media containing purified



phosphatide or certain synthetic detergent agents In May of 1946 he reported further observations, amplifying this discovery Tubercle bacilli had been grown under the surface of media by Youmans, Drea Friedman and others, but Dubos apparently gave us the first conclusive evidence that this might occur following minimal inoculations, and the publicity following his report has greatly stimulated further investigations At the time of this meeting, I have seen the Dubos medium but have had no personal experience with it, and it is still questionable whether it may be clinically practicable It has undoubtedly been an advance in the study of the bacteriology of the tubercle bacillus which may lead to practical application which can now be only dimly anticipated

(Author's note January, 1947 At that very time, June 1946, Foley, in the Proceedings of the Society for Experimental Biology and Medicine, actually reported the use of Dubos' medium as a diagnostic agent, and my own further studies have tended to confirm Dubos' claims)

*Question* Is high protein intake justified in proven (?) tuberculous empyema

*Answer* (Dr Waring) Yes

*Question* Have you observed the pneumothorax lung expanding under fluid, displacing the fluid upward in spite of gravity? Explain

*Answer* (Dr Ochsner) Yes, this has been observed and is due to a detachment of the lung below

*Question* How often in your experience does hemorrhagic effusion occur? I have had two cases recently Why not oftener? Would you aspirate and replace with air or just aspirate? My case was aspirated and is O K

*Answer* (Dr Waring) In my experience hemorrhagic effusion in pulmonary tuberculosis has been quite rare I would not aspirate and replace with air but would just aspirate

*Question* What methods may be used to handle mediastinal herniation complicating artificial pneumothorax?

*Answer* (Dr Ochsner) The best method is to decrease the tension within the hemithorax An attempt has been made to stabilize the mediastinum by injecting small amounts of oil into the pleural cavity, and, although this does stabilize the mediastinum, it has the distinct disadvantage that it produces pleural reaction elsewhere and is likely to produce exudation and sufficient reaction of the pleura covering the lung that re-expansion may be interfered with Certainly the results from the oil are worse than the advantages By decreasing the pressure within the hemithorax, herniation will be relieved

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# Editorial

## MEDICAL RESEARCH

The medical profession has little reason to be proud of its record in medical research, nor can our profession be complacent about the future of strictly medical research

If we study the records for coordinated information on medical research in this country, we realize how scanty and sketchy it is. As Gregg so aptly puts it, "We find only the poorly cultivated fields of clinical research"

Medical Research has always lagged as evidenced by the fact that nicotinic acid was known to chemists as early as 1867. However, it was not until 1938—seventy-one years later—that this substance was found to be highly efficacious in the treatment of pellagra. It is appalling to think of how many pellagra patients could have been cured or benefitted during those 71 years.

Sulfanilimide was known to most chemists 30 years before it was put to clinical use. It is impossible to estimate the number of individuals who were deprived of the benefits of this drug during those 30 years. It was 14 years after Fleming discovered penicillin before a substantial number of cases were treated in order to evaluate it as a clinical asset. Again, for at least 10 or 12 years, the people of the world were deprived of the benefits of penicillin. There are in existence today, a half-dozen vitamins, the medical uses of which are entirely unknown and unexplored.

We speak of the great progress of medical science during the past two or three decades, and we can be truly proud of this progress, however, as a medical profession, we can take only a small part of the credit for this progress. The basic discoveries, which have contributed so much to medical progress, were made by scientists in other fields. Medical research up until the present time has concerned itself, chiefly, with the application of the materials and scientific aids discovered by others. It is true, of course, that a great deal of medical research has been carried on in such diverse branches as surgery, psychiatry, pathology, and public health.

There are many reasons why medical research has lagged far behind research in other fields, first, because there is a dearth of medical researchers, second, those who are doing medical research today are mostly men, who, for financial reasons, must practice medicine or teach, therefore, making it impossible to devote their full time to research, third, much of the medical

advance of recent years has been due to the activities of a few private foundations and is not based on public subscription. Think what it would mean if we physicians would add 5 per cent to our medical fees in each case and set it aside for research, upon the disease or diseases which we are treating. Research work is like work in any other field, those doing the work must be compensated. Industry recognizes this and has set up research departments manned by scientists. Industry spends millions of dollars in research—the medical profession, as a whole or even in part, has not provided funds for medical research.

The American College of Chest Physicians has recently created a research council. This council is made up of two sections: A Scientific Section and a Financial Section.

*The Scientific Section* is now studying and formulating plans for specific research in the field of Diseases of the Chest. They are studying the problems which most obviously should be turned over to research workers and, also, studying personnel best equipped to carry on such research. The days of the lone-wolf researcher are about over. Medical problems, as yet unsolved, are so complex that no one man alone can cope with them. It now requires teams of specialists and scientists such as biologists, micro-biologists, chemists, and bio-chemists, bacteriologists, physicists, as well as medical men working together if real progress in medical research is to be accomplished.

*The Financial Section* will assist in securing funds and will finance a research project once it has been thoroughly investigated and finally recommended by the scientific section, however, both the scientific section and the financial section must unanimously approve the project and the expenditure. In this way research funds will be carefully protected.

The American College of Chest Physicians is a young organization, however, in the past 13 years it has grown to be one of the outstanding specialty organizations in the world. We believe we are the first of such organizations to sponsor medical research. For that reason we are receiving much favorable comment from directors of foundations and philanthropists who are interested in assisting medical research. They recognize that medical research will be more intelligently directed and funds more wisely expended when sponsored by a group such as the American College of Chest Physicians, because it has shown its interest by creating a basic research fund of its own and establishing a highly capable research council.

We are sure that the Fellows of the American College of Chest Physicians are justly proud of the accomplishments of our organization and will join whole-heartedly in assisting this, its most

important movement There is hardly a fraction of the much-needed medical research being done in the field of Diseases of the Chest Time has proved medical research must be supported, at least in part, by the medical profession itself It is our hope that the American College of Chest Physicians will be one of the leaders in this field

C M H

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## Editorial

### THE PAN-AMERICAN CONGRESS ON TUBERCULOSIS

The Pan-American Congress on Tuberculosis is one of the most outstanding meetings of professional workers in diseases of the chest held on the western hemisphere. This is a biennial event attended by delegates from all of the Central and South American nations and the United States. The Seventh Congress was held in Lima, Peru, March 17-22, 1947. The President, Professor Ovidio Garcia Rosell, of Lima, together with the other chest specialists of that city, did themselves proud in making arrangements for the meeting. Several of them gave up all other activities, including their office practices, for the first three weeks in March and devoted their time exclusively to arrangements for this important meeting so every possible attention could be given to their guests while the Congress was in session. The hospitality they manifested was superb. No stone was left unturned to provide for the comfort, entertainment and instruction of each individual delegate. Several of the leading chest specialists entertained delegates in their homes. The hospitals offered every facility for instruction, and ample opportunity was afforded to visit the oldest university on the western hemisphere, including its fine school of medicine. Even the President of Peru entertained members of the Congress in the presidential palace.

Before the regular sessions of the Congress, a large number of papers on many phases of tuberculosis and other chest diseases were presented. Results of original scientific and clinical investigations were reported. Many fine contributions to our knowledge of diseases of the chest have been made by physicians and scientists in the Central and South American countries. Much excellent investigative work is now in progress in these countries.

Dr I Cosío Villegas, of Mexico, was elected president and the next Congress will be held in Mexico City in 1949. Every physician practising diseases of the chest on the western hemisphere who can possibly arrange to attend this Congress should do so. Dr Cosío Villegas and his co-workers are already developing plans for this important meeting. A display of sincere hospitality is assured and a program from which all can greatly profit will be presented. Here will be another opportunity for physicians from all the Americas to join hands and strive for the eradication of some of the worst destroyers of mankind.

J A M

## VII Congreso Pan-Americano de la Tuberculosis (ULAST)

LIMA PERU

March 17 - 22, 1947

Delegates from seventeen Latin-American countries and the United States assembled at Lima, Peru, March 17-22, to participate in the seventh Pan-American Congress against tuberculosis

The following subjects were discussed among the delegates of the various countries at this Congress

- 1 Results of mass tuberculosis surveys
- 2 Tuberculous tracheobronchitis
- 3 Social and economic problems of the tuberculous

The following papers were presented by invited guest speakers from the different countries

*"Unresolved Pleurisy (Physiopathogenic Aspects and Treatment),"*  
Nicholas Romano, M.D., Buenos Aires Argentina

*"Physiology of Respiration in High Altitudes,"*  
Carlos Monge M.D. Lima Peru

*"Oleothonax" (Presentation of a Series of Cases),*  
Jorge A Higgins M.D. F.C.C.P., Guayaquil, Ecuador

*"The Excision of Tuberculous Lungs", "Experiences in the Treatment of Tracheobronchial and Other Complicated Forms of Tuberculosis", and "The Technique of Pulmonary Segmental Resection,"*  
Richard H Overholt M.D., F.C.C.P. Brookline, Massachusetts, U.S.A

A great interest was shown in the scientific discussions and all of the sessions were well attended

### COUNCIL ON PAN AMERICAN AFFAIRS

The Council on Pan American Affairs of the American College of Chest Physicians held a breakfast meeting at the Hotel Bolívar on Wednesday March 19th. This session was attended by the following members of the Council and delegates

Alonso Vial Armando, Santiago Chile  
Antezana Estrada Jose, La Paz, Bolivia  
Araujo, Cesar de Bahia, Brazil  
Arboleda Diaz, Carlos Governor, Bogota, Colombia  
Baldó, José Ignacio, Governor, Caracas, Venezuela  
Corbañán T., Gonzalo, Governor, Santiago, Chile  
Coronado Iturbe, Enrique, Governor, Guatemala City, Guatemala  
Cosío Villegas, Ismael, Governor, Mexico City, D.F.  
Crisolillo Rivas, Julio, Caracas, Venezuela  
Eloesser, Leo, Vice-Chairman, San Francisco, California, U.S.A  
Etzel, Eduardo, Sao Paulo, Brazil  
Fajardo Castillo, Jorge, Guayaquil, Ecuador  
Fernandez, Reginaldo, Governor, Rio de Janeiro, Brazil  
Frelle, Gonzalo, Guayaquil Ecuador  
Garcia Capurro, F., Montevideo, Uruguay  
García Rosell, Ovidio, Governor, Lima, Peru  
Garreton Unda, Ildefonso, Governor, Concepcion, Chile

AMERICAN MEETING, PERUVIAN CHAPTER,  
*American College of Chest Physicians*  
Yacht Club, Lima, Peru, March 21, 1947



Members and guests of the American College of Chest Physicians who attended the Luncheon Meeting sponsored by the Peruvian Chapter of the College at the Yacht Club, Lima, Peru, on March 21, 1947

Gomez, Fernando, *Governor*, Montevideo, Uruguay  
 Higgins, Jorge, Guayaquil, Ecuador  
 Hilleboe, Herman, Washington, D C, U.S.A  
 Howard, Ernest, Washington, D C, U.S.A  
 Jackson, Chevalier L, *Chairman*, Philadelphia Pennsylvania U.S.A  
 Jimenez, Miguel, Mexico City, D F, Mexico  
 Kornfeld, Murray, *Executive Secretary*, Chicago, Illinois U.S.A  
 Lopez Vargas, Ramon, Valparaiso, Chile  
 Lozano Roche, Aradio, Mexico City, D F  
 Mastellari, A Vicente, *Regent*, Panamá City, Panama  
 Mejia C, Rafael J, Medellín, Colombia  
 Mendoza, René G, Habana, Cuba  
 Myers, J Arthur, *Regent*, Minneapolis, Minnesota, U.S.A  
 Narvaez, Victor, Lima, Peru  
 Navarrete, Antonio, *Regent*, Habana, Cuba  
 Noble Carlos, Mexico City, D F  
 Nowak, Wenceslao, Guayaquil, Ecuador  
 Overholt, Richard H, *Vice-President*, Brookline Massachusetts U.S.A  
 Perez, Jose Antonio, Córdoba, Argentina  
 Posse, Rafael, Buenos Aires, Argentina  
 Sarmiento, Jorge, Lima, Peru  
 Sayago, Gumersindo, *Regent*, Cordoba, Argentina  
 Selva Leon, Bartolomé, Habana, Cuba  
 Sierra Somerville, Victor, Santiago, Chile  
 Soto Blanco, Juan, Montevideo, Uruguay  
 Sweany, Henry C (guest), Chicago, Illinois, U.S.A  
 Vacarezza, Oscar, Buenos Aires, Argentina  
 Vacarezza, Raul, *Governor*, Buenos Aires, Argentina  
 Valledor, Theodosio, Habana, Cuba  
 Vargas Lopez, René, *Governor*, Managua, Nicaragua

Dr Jackson, Chairman of the Council on Pan American Affairs presided at this meeting and introduced the officials of the College from the various countries. All of the Governors and Regents of the College presented interesting reports of the College activities in their respective countries. Dr Sierra Somerville the Secretary of the Chilean Chapter, announced that Chile had organized a College Chapter with 70 members. Dr Baldó, Governor of the College for Venezuela, announced that Venezuela now has 22 members and has completed plans for the organization of the College Chapter in that country. Dr Mastellari, Regent of the College for Central America, stated that the Central American countries had 24 members and that a Chapter of the College would be organized in El Salvador, Central America, in August.

Dr Leo Eloesser, San Francisco, California Vice-Chairman of the Council on Pan American Affairs of the College who recently returned from China, was introduced and received a great ovation. Dr Eloesser spoke of his experiences in China and of the potentialities of world organization.

#### PERUVIAN CHAPTER SPONSORS MEETING

The Peruvian Chapter of the American College of Chest Physicians sponsored a luncheon meeting at the Yacht Club, Lima, Peru, on Friday, March 21st. The meeting was attended by approximately 100 members of the College and invited guests from all of the Latin American countries and the United States. Dr Maximo Espinoza Galarza, President of the Peruvian Chapter of the College, presided at this meeting. Dr Leo Eloesser, Vice-Chairman of the Council on Pan American Affairs of the College, was introduced by Dr Gumersindo Sayago, Regent of the College for Argentina. Dr Eloesser's report is published elsewhere in this issue of the Journal.



## Remarks of Dr L Eloesser

*Vice-Chairman of the Council on Pan American Affairs of the American College of Chest Physicians at the luncheon tendered on March 21, 1947 by, the Peruvian Chapter of the College to the visiting delegates*

Dr Max Espinoza Galarza, President of the Peruvian Chapter,

Dr Ovidio Garcia Rosell President of ULAST,

Fellow members

Dr Chevallier L Jackson, Chairman of the Council on Pan American Affairs, has asked me to take his place in trying to thank you for your countless courtesies, and in attempting to express the gratitude of the American College of Chest Physicians for the generous cordiality with which you have received us. I fear however, that not only I, but the far more articulate representatives of Central and South American countries who were to speak at this luncheon will have to yield to the clamours of our Lady, The Sea. The thunder of her surf drowns our voices however strongly we may raise them. I shall therefore report to you on the activities of the College for the past year through the columns of the Journal instead of by word of mouth, and shall merely attempt to express the sentiments of all visiting delegates in begging you to accept our profound gratitude and appreciation for your lavish and bounteous hospitality.

The College now counts 8 chapters in Latin American countries with a membership of 380. Besides these it has a chapter in Greece with 15 members. South African, Australian and Chinese chapters are contemplated. The Argentinian Chapter has 66 members (Dr Gumersindo Sayago, Regent, Dr Raul F Vacarezza, Governor). Bolivia has 6 members, not yet sufficient for a separate chapter. The Brazilian Chapter has 50 members (Dr Affonso MacDowell, Regent, Dr Reginaldo Fernandez, Governor, Dr Jose Silveira, Governor, Dr Samuel Libanio, President). Central America, including Guatemala, Salvador, Nicaragua, Costa Rica and Panama, has 24 members and is about to organize a chapter (Dr Amadeo V Mastellari Panama, is Regent, Governors for the Central American countries are Dr Coronado Iturbide, Guatemala, Dr Carlos Gonzalez, Salvador, Dr Rene Vargas L, Nicaragua, Dr Raul Blanco Cervantes, Costa Rica, and Dr Augustin A Sosa, Republic of Panama). Colombia has 10 members and is about to organize a chapter (Dr Carlos Arboleda Diaz, Governor). Cuba has a chapter with 24 members (Dr Antonio Navarrete, Regent, Dr Octavio Rivero, Governor). Chile has the largest membership of any of the Latin American Republics, its chapter numbers 70 (Dr Hector Orrego Puelma, Santiago, Regent, Dr Gonzalo Corbalan, Santiago, Dr Gilberto V Zamorano, Valparaiso, and Dr Ildefonso Garreton, Concepcion, Governors). Ecuador has 6 members, not yet sufficient for a chapter (Dr Juan Tanca Marengo, Governor). Mexico has 39 members in its chapter (Dr Donato G Alarcon, Regent, Dr I Cosio Villegas, Governor). Paraguay has 3 members, not yet sufficient for a chapter (Dr Angel Gines, Governor). Peru has a chapter with 22 members (Dr Ovidio Garcia Rosell, Governor, and our host, Dr Max Espinoza Galarza, President). Puerto Rico has 34 mem-

bers in its chapter (Dr David E Garcia, Regent, Dr A M Marchand Governor, Dr Antonio Acosta Velarde, President) Uruguay has 4 members (Dr Fernando D Gomez, Governor) Venezuela has 22 members and is about to organize a chapter (Dr Jose Ignacio Baldo, Governor)

*Education* The College is vitally interested in both undergraduate and postgraduate education in diseases of the respiratory organs A Textbook entitled "The Fundamentals of Pulmonary Tuberculosis and Its Complications (for the Student, the Teacher and the Practicing Physician," to which outstanding members of the College have contributed is now being published under the auspices of the College by Charles C Thomas Publishers of Springfield, Illinois and Baltimore It should be off the press in about six months Among the contributors may be mentioned Drs Andrew L Banyal, Emil Bogen, Benjamin L Brock, E W Hayes, Sumner Cohen, C M Hendricks, Herman E Hilleboe, Paul H Hollinger, Frank L Jennings, S U Marletta, Jay Arthur Myers, Edwin R Levine, C Howard Marcy, Richard H Overholt, Oscar Sander, J Winthrop Peabody, Thomas J Gilbert, Ralph C Matson and William S Conklin A Spanish translation is projected A Textbook of non-tuberculous diseases of the respiratory tract is also being prepared

*Postgraduate Education* is being provided for by short postgraduate courses in Philadelphia and Chicago

*Professional Standards* The establishment and maintenance of adequate professional qualifications have been discussed For the past five years candidates for admission to the United States Chapters of the College have been required to undergo examination, in order to assure of their proper professional preparation The Mexican Chapter plans to conduct entrance examinations beginning in 1948, the Argentinian Chapter has similar plans

*Research* Although large funds for aid to research exist in the United States, the College has proposed to collect a Fund of its own for research Fifteen thousand dollars is already on hand, a goal of \$100 000 has been set It is recognized that even this sum is insufficient for extensive or ambitious investigation, it is hoped, however, that the College may be in a position to lend weight to projects which meet with its approval by participating in funds allocated by other authorities and may elicit larger grants from other sources by its own monetary contributions, giving an earnest, as it were, of its support

*Meetings* of the College and Chapter meetings afford opportunity for interchange of scientific thought and opinion We call especial attention to the coming meeting in Atlantic City on June 5 to 8 This meeting should be of uncommon interest A most attractive and varied list of eminent speakers has been assured Furthermore, the meeting immediately precedes the Centenary Meeting of the American Medical Association, which will mark a milestone in the history of medical progress Those contemplating attendance should communicate with Mr Kornfeld immediately

This report, Mr President and Fellow-Delegates, although necessarily incomplete, may serve to sketch in outline some of the activities of your College The spirit of this gathering makes it scarcely necessary to urge continuance of your hearty cooperation and support We tender grateful recognition to our executive secretary, Mr Murray Kornfeld, for his untiring enthusiasm and energy We recognize that the College is *our* College Its future lies in *our* hands and in *our* efforts

# 13th Annual Meeting American College of Chest Physicians

AMBASSADOR HOTEL, ATLANTIC CITY, NEW JERSEY

June 5 - 8, 1947

Atlantic City will be host this year to the American Medical Association and the American College of Chest Physicians, as well as to a number of other medical specialty societies who are planning to hold meetings there. It is anticipated that the attendance will be very large and we therefore urge you to make your hotel reservations at once if you are planning to go to Atlantic City for the meetings. Please write to the Ambassador Hotel for hotel accommodations for the College meeting, June 5-8, and to the Convention Bureau at Atlantic City for hotel accommodations for the meeting of the American Medical Association.

The preliminary Scientific Program for the College meeting was published in the March-April issue of *Diseases of the Chest*, and the final program has now been placed in the mails for delivery to College members. Some of the added special programs scheduled for the meeting are announced below.

## "INFORMATION PLEASE IN DISEASES OF THE CHEST"

"Information Please in Diseases of the Chest" will again be presented as a feature of the College meeting. A group of recognized experts in medicine, surgery, pathology, bronchoscopy and roentgenology, as named below, will be on hand to answer your questions. All questions should be sent to the Executive Offices of the College in Chicago in advance of the meeting. The questions which are accepted will be published with the answers in "Diseases of the Chest." The Panel of Experts will be as follows:

*Medicine* Hobart A. Reimann, M.D., Philadelphia, Pennsylvania  
*Surgery* Brian B. Blades, M.D., F.C.C.P., Washington, D. C.  
*Pathology* S. A. Levinson, M.D., Chicago, Illinois  
*Bronchoscopy* Henry B. Orton, M.D., Newark, New Jersey  
*Roentgenology* Eugene P. Pendergrass, M.D., Philadelphia, Pa.

## LUNCHEON MEETINGS

### *Annual Conference of College Chapter Officials*

Thursday, June 5th, 12:00 Noon, Hotel Chelsea

The Conference of College Chapter Officials will hold a luncheon meeting at the Annual Meeting of the College at which time problems of particular interest to the College Chapters will be discussed. Dr. Nelson W. Strohm, Buffalo, New York, Chairman of the Conference, will preside.

### *Council on Public Health*

Friday, June 6th, 12:00 Noon, Hotel Chelsea

The Council on Public Health of the College is sponsoring a luncheon meeting to which all physicians are invited. The general topic of discussion will be "Experiences of the United States Services in the Control

of Tuberculosis in World War II as Compared with World War I, and Plans for the Future' The speakers will be Dr Francis J Weber Medical Director, Chief Tuberculosis Control Division, U S Public Health Service, Washington, D C who will speak for the U S Public Health Service, Commander Sidney A Britten MC, USN who will speak for the Navy, Dr Roy A Wolford, Assistant Chief of the Tuberculosis Division, Veterans Administration, who will speak for the Veterans Administration, and Dr John B Grow, Denver, Colorado, who will speak for the Army Dr John Barnwell, Chief, Tuberculosis Division Veterans Administration, will summarize the discussions

Dr Paul A Turner, Louisville, Kentucky, Chairman of the Council on Public Health will preside at the meeting

*Conference of Medical Directors and Superintendents of  
Tuberculosis Hospitals and Sanatoria*

Saturday, June 7th, 12 00 Noon, Hotel Chelsea

This Conference will be sponsored by the Council of Medical Directors and Superintendents of Tuberculosis Hospitals and Sanatoria of the College under the Chairmanship of Dr Benjamin L Brock Chicago, Illinois The reports of the Subcommittees on Sanatorium Standards and Rehabilitation will be made and there will be a general discussion of problems which concern medical directors and superintendents of our tuberculosis hospitals and sanatoria

The guest speaker on this program will be Dr Madge Thurlow Macklin, Ohio State University, Columbus Ohio, and the subject of her talk is 'Pitfalls in Dealing with Cancer Statistics Especially as Related to Cancer of the Lung'

*Conference of Tuberculosis Committees*

Sunday June 8th, 12 00 Noon, Hotel Chelsea

The National Council of Tuberculosis Committees of the College is sponsoring this Conference of all of the tuberculosis committees of the state and county medical societies for the purpose of exchanging ideas and information There will be a talk by Dr Carl H Gellenthien, Valmore, New Mexico on "Discussion of State and County Tuberculosis Committees" Dr Tom D Spies, Assistant Professor of Medicine, University of Cincinnati, Cincinnati, Ohio, has been invited to address the Conference and the subject of his talk will be "Recent Advances in Vitamin Research as Related to Clinical Medicine"

Dr James H Stygall, Indianapolis Indiana, Chairman of the Council, will preside at the Conference

BOARD MEETINGS

The Executive Council of the College will meet Thursday morning, June 5th

The Board of Governors will hold its annual meeting on Thursday morning, June 5th

The Board of Regents will meet Thursday afternoon, June 5th

ADMINISTRATIVE SESSION

The Administrative session of the College will be held Friday morning, June 6th, at which time the Councils and Committees will report The election of officers will follow

### CONVOCATION

The College will conduct a Convocation, Saturday afternoon, June 7th, when Life Membership Certificates and Fellowship Certificates will be awarded. This will be a formal affair and will be open to members of the College, their families and friends. The Convocation will be conducted by the Board of Regents of the College and Dr. Robert Livingston Johnson, President of Temple University, Philadelphia, Pennsylvania, will address the assembly.

### COCKTAIL PARTY AND PRESIDENTS' BANQUET

The Annual Presidents' Banquet will be held Saturday evening, June 7th. Dr. Charles M. Hendricks, President of the College, will deliver his presidential address, and the President-Elect, Major General S. U. Marietta, will be installed as President. The first College Medal will be awarded by Major General S. U. Marietta, who is Chairman of the Awards Committee of the College. The New Jersey and Pennsylvania Chapters of the College will be host at the cocktail party which will precede the Presidents' Banquet.

### INTERNATIONAL NIGHT DINNER

Thursday night, June 5th, will be given over to the Councils on Pan Pacific Affairs, Pan American Affairs and European Affairs of the College and a Scientific program suitable for this occasion will be presented. Dr. Harry C. Warren, Chairman of the Council on Pan Pacific Affairs, will preside, assisted by Drs. Chevalier L. Jackson and Andrew L. Banyal, Chairmen of the Councils on Pan American Affairs and European Affairs, respectively.

### CLINICAL - X-RAY - PATHOLOGICAL CONFERENCE

A Clinical - X-ray - Pathological Conference will be held at the Atlantic City Hospital on Sunday, June 8, at 5:15 P. M. Dr. Charles Hyman of Atlantic City is chairman of the Conference. Information regarding the Conference may be obtained at the Registration Desk in the Ambassador Hotel.

### X-RAY CONFERENCE

The meeting will close on Sunday night, June 8th, with an X-Ray Conference which will be held at the Ambassador Hotel, starting at 8:00 P. M. Dr. Louis Mark will be Moderator at the Conference.

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# College Chapter News

## CALIFORNIA CHAPTER

The California Chapter of the College held its annual meeting at the Biltmore Hotel, Los Angeles, on Friday afternoon, May 2, at the time of the annual meeting of the California Medical Association. The following program was presented:

'Bronchogenic Carcinoma of the Lung (with motion pictures) "

Bert Cotton, M.D.

Discussion by Seymour M. Farber, M.D., F.C.C.P.

'Bronchiectasis — A Symposium,'

A The Problem, J. J. Singer, M.D., F.C.C.P.

B The X-ray Picture, R. W. Weathered, M.D.

C Medical Management, David T. Proctor, M.D., F.C.C.P.

D The Surgical Treatment, David J. Dugan, M.D.

E Prevention, Reginald H. Smart, M.D.

F Questions from the Floor

"Advances in the Treatment of Tuberculosis "

A Medical

1 Promin in Laryngeal Tuberculosis, J. M. Black, M.D.

2 Streptomycin in Laryngeal Tuberculosis,

Solomon B. Netzer, M.D.

3 Streptomycin in Pulmonary Tuberculosis,

William Cassidy, M.D., F.C.C.P., Edward Dunner, M.D.,  
and Forrest G. Bell, M.D., F.C.C.P.

Discussion by Emil Bogen, M.D.

B Surgical

Indications for Pulmonary Resection in Tuberculosis,

Lyman A. Brewer, III, M.D.

Discussion by Ambrose S. Churchill, M.D.

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## CHILEAN CHAPTER ORGANIZED

The Chilean Chapter of the American College of Chest Physicians was formally organized at Santiago, Chile, with Dr. Hector Orrego Puelma, President, and Dr. Victor Sierra Somerville, Secretary.

The following physicians have been appointed as Governors of the College in Chile:

Dr. Gonzalo Corbalan T., Santiago,

Dr. Gilberto Zamorano, Valparaiso,

Dr. Ildefonso Garretón Unda, Concepción.

Dr. Hector Orrego Puelma is the Regent of the College for the country.

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## ILLINOIS CHAPTER

The Illinois Chapter of the College held its annual meeting at the Palmer House in Chicago on May 11, just prior to the meeting of the Illinois State Medical Society, May 12-14, 1947. The following excellent program was presented:

"Antibiotics in the Medical Treatment of Bronchial Infections,"

Edwin R Levine, M D , F C C P , Chicago, Illinois

"The Production of Pleural Adhesions for Therapeutic Purposes,"

John D Steele, M.D , Milwaukee, Wisconsin

"Diagnosis of Pulmonary Mycoses,"

Morris Moore, Ph.D , St Louis, Missouri

"Extrapleural Pneumothorax,"

Theodore R Hudson, M.D , and Chester W Moen, M.D ,

Edward Sanatorium, Naperville, Illinois

#### *Business Session*

Jullus B Novak, M.D , F C C P , Chicago, President, Illinois Chapter,  
presiding

*Dinner, Palmer House, Chicago*

*Dinner Spcaker* Arnold Shamaskin, M.D , F C C P , Chief, Tuberculosis  
Service, Veterans Hospital, Hines, Illinois

"The Use of Streptomycin in the Treatment of Human Tuberculosis,"

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### MARYLAND - DISTRICT OF COLUMBIA CHAPTER

The Maryland-District of Columbia Chapter of the College had a most successful meeting in Baltimore on April 21 The program was carried out as published in the March-April issue of the journal, and the scientific meeting was very well attended

At the business meeting it was voted to change the name of the Chapter to the "Potomac Chapter" because the original name seemed too cumbersome and did not include the West Virginia group This matter will be taken under consideration by the Board of Regents of the College at their annual meeting in June

Officers elected to serve for the ensuing year are as follows

W LeRoy Dunn, M.D , Washington, D C , President

Otto C Brantigan, M.D , Baltimore, Maryland, Vice-President

I B Lyon, M.D , State Sanatorium, Maryland, Secretary-Treasurer

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### NEW JERSEY CHAPTER

The Annual Meeting of the New Jersey Chapter of the College was held in conjunction with the New Jersey State Medical Society on April 23, 1947, at the Chalfonte-Haddon Hall Hotel, Atlantic City, New Jersey Thirty Fellows of the College attended the meeting and the scientific discussion was very interesting Dr Irving Willner, F C C.P , Newark President of the Chapter, emphasized the National Meeting of the College and advised those who had not already done so, to make application at once to the Ambassador or Chelsea Hotels After luncheon an address was made on "Chemotherapy in Tuberculosis" by Dr George G Ornstein, F C C.P , New York City A number of chest x-rays presented by various members of the Chapter were discussed

At the meeting, the following officers were elected for the coming year

Harold S Hatch, M.D , Morristown, President

Paul K Bornstein, M.D , Asbury Park, Vice-President

Homer L Cherry M.D , Paterson, Secretary-Treasurer

## NORTH MIDWEST CHAPTER

The annual meeting of the North Midwest Chapter of the College will be held in Duluth, Minnesota, the afternoon of July 1st, in conjunction with the meeting of the Minnesota State Medical Association. The program is as follows:

"Follow-up Diagnostic Procedures of Roentgen Lesions Found by Survey Methods,"

W Roemmich M.D. Minneapolis, Minnesota

Discussion by Jay Arthur Myers, M.D., F.C.C.P., Minneapolis, Minn.

"Commoner Intrathoracic Tumors,"

Thomas J. Kinseiff, M.D., F.C.C.P., Minneapolis, Minnesota

"Roentgen Diagnosis of Early Carcinoma of the Lung,"

Leo G. Rigler, M.D., Minneapolis, Minnesota

Discussion by S. S. Cohen, M.D., F.C.C.P., Oak Terrace, Minnesota

"Streptomycin in the Treatment of Tuberculosis,"

Karl H. Pfuetze, M.D., F.C.C.P., Cannon Falls, Minnesota

Discussion by G. A. Hedberg, M.D., F.C.C.P., Nopeming, Minnesota,  
and Dexter Lufkin, M.D., F.C.C.P., Minneapolis, Minnesota

Dr. Jay Arthur Myers, Minneapolis, Minnesota, will preside at the scientific session. There will be a luncheon for members and guests of the American College of Chest Physicians on Tuesday, July 1, at 12:15 P.M. The location for the luncheon will be announced later.

## ROCKY MOUNTAIN CHAPTER

Dr. A. M. Mullett, F.C.C.P., Colorado Springs, Colorado, President of the Rocky Mountain Chapter of the College, has announced the following committee appointments:

*Medical Education Committee*

Lorenz W. Frank, M.D., Denver, Colorado, Chairman

William C. Service, M.D., Colorado Springs, Colorado

William Ray Rumel, M.D., Salt Lake City, Utah

John A. Cremer, M.D., Denver, Colorado

*Membership Committee*

John S. Bouslog, M.D., Denver, Colorado, Chairman

Irby Ballenger, M.D., Albuquerque, New Mexico

Albert Guggenheim, M.D., Denver, Colorado

Ralph Rigby, M.D., Salt Lake City, Utah

*Program Committee*

B. T. McMahon, M.D., Denver, Colorado, Chairman

Arnold Minnig, M.D., Denver, Colorado

Robert O. Brown, M.D., Santa Fe, New Mexico

John B. Grow, M.D., Denver, Colorado

*Publicity Committee*

Phineas Sparer, M.D., Spivak, Colorado, Chairman

Allan Hurst, M.D., Denver, Colorado

Henry Jernigan, M.D., Albuquerque, New Mexico

*General Arrangements Committee*

W. Bernard Yegge, M.D., Denver, Colorado, Chairman

Jack Bartholomew, M.D., Boulder, Colorado

John G. Wolf, M.D., Pueblo, Colorado

H. M. Van Der Schouw, M.D., Wheatridge, Colorado



## College News Notes

### CHILE OPENS NEW SANATORIUM

Murray Kornfeld, Executive Secretary of the American College of Chest Physicians, participated in the dedication of the Trudeau Hospital at Santiago, Chile, on March 27, 1947. This 500-bed sanatorium was built jointly by the Coordinator of Inter-American Affairs of the U.S.A., and the Government of Chile. The hospital will be under the direction of Dr. Rafael Lorca O., who has been appointed as Superintendent and Medical Director. Dr. Theodore Gandy, representative of the Coordinator of Inter-American Affairs in Chile, gave the principal address at the dedication. The United States Government was represented by the Hon. Claude G. Bowers, Ambassador from the United States to Chile, and by other dignitaries. Mrs. Gonzalez Videla, wife of the President of Chile, represented the Chilean Government at the dedication.

Dr. Hector Orrego Puelma, Regent of the College for Chile, and Dr. Armando Alonso Vial, thoracic surgeon, Santiago, Chile, also participated in the dedication exercises.

*Dedication of the Trudeau Hospital, Santiago, Chile, March 27, 1947*

HOSPITAL TRUDEAU



Left to right: Dr. Armando Alonso Vial, Dr. Hector Orrego Puelma, Dr. Theodore Gandy, Mr. Murray Kornfeld and Dr. Rafael Lorca O.

### DR OVERHOLT LECTURES IN SANTIAGO, CHILE

Dr Richard H Overholt, Brookline Massachusetts, First Vice-President of the American College of Chest Physicians, delivered a series of lectures at Santiago, Chile on April 2 3 and 4 The first lecture was given at the University of Chile, and the subject was 'The Pulmonary Segments as a Unit of Excision' Two lectures were given at the Catholic University, the first on "The Principles of the Surgical Treatment of Tuberculosis," and the second on "The Principles of Surgical Treatment of Non-Tuberculous Chest Diseases"

The final lecture was delivered at the Sociedad Chilean de Fisiologia and Sociedad de Cirugia on "Cancer of the Lung" All of the lectures were well attended, and a great deal of enthusiasm was exhibited by the doctors in Chile who came from many distant points to hear Dr Overholt

Dr Overholt is continuing his trip through Argentina, Uruguay and Brazil, where he will conduct a series of lectures The local Tuberculosis Societies in all of these countries are cooperating with the College Chapters in sponsoring these meetings

See page 280 for photograph of Dinner given in Honor of Dr Overholt

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### 1949 ULAST CONGRESS

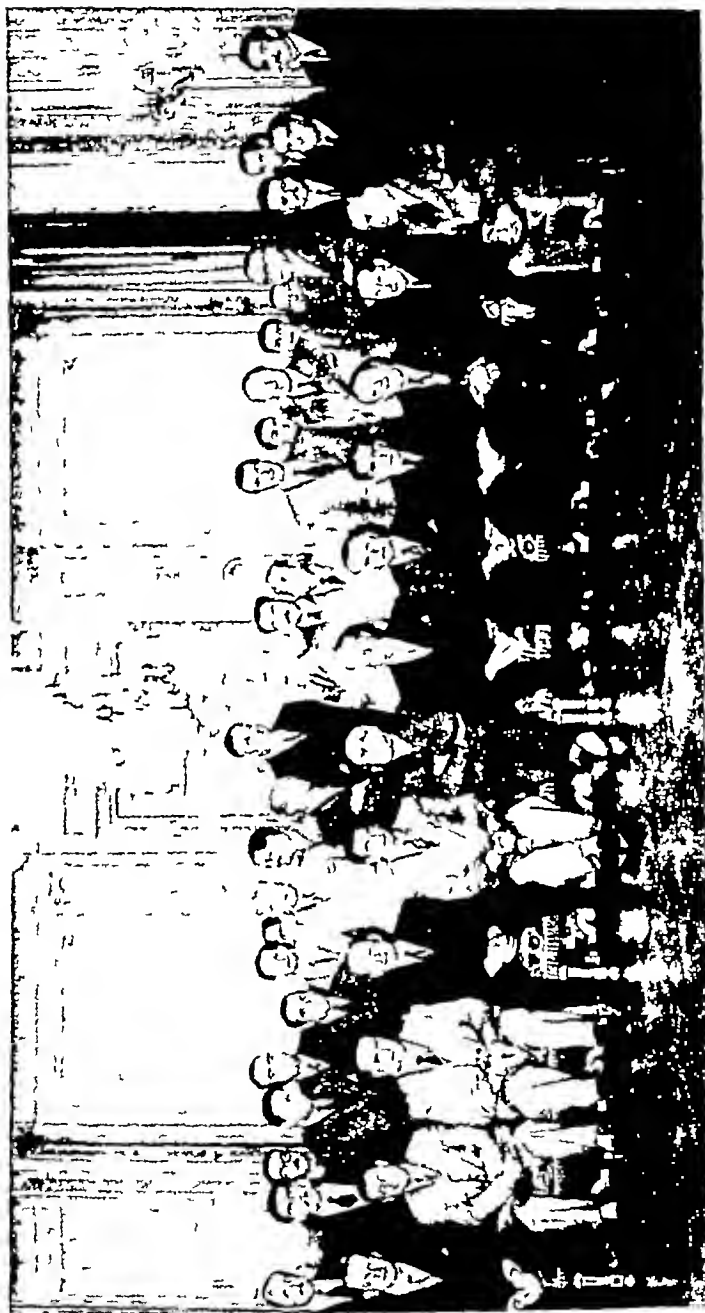
It was voted to hold the next ULAST Congress in Mexico City in 1949 Dr I Cosío Villegas, Governor of the College for Mexico, was elected President of ULAST The Council on Pan American Affairs of the American College of Chest Physicians plans to participate in the next Congress

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Otto L Bettag, M.D, F.C.C.P, Medical Director of Livingston County Tuberculosis Sanitarium and Tuberculosis Officer for Pontiac Reformatory, addressed the medical staff of the Peoria Municipal Tuberculosis Sanitarium on March 31 The subject of Dr Bettag's talk was "Unusual Chest Cases," and films of interesting lesions of the chest were shown

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DINNER GIVEN IN HONOR OF DR. OVERHOLT  
Club Union, Santiago, Chile



The above physicians attended the dinner given in honor of Dr. Richard H. Overholt at the Club Union, Santiago, Chile, April 8, 1947

## Medical Service Bureau

### POSITIONS AVAILABLE

Approved Tuberculosis Sanatorium desirous of obtaining applications for residencies beginning July 1st All types of compression and surgical therapy in the modern treatment of tuberculosis 200 bed hospital salary range \$190 - \$300 applicants please state experience previous training age and social background etc Please address Box 154A American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

Resident physician wanted for 80 bed tuberculosis sanatorium approved by the A.M.A. and American College of Surgeons Salary to \$250 plus complete maintenance for single man Send photograph and complete record of training and experience in first letter Dr D F Loewen, Medical Director Macon County Tuberculosis Sanatorium Decatur Illinois

Full time resident physician wanted at tuberculosis hospital all phases of chest work \$350 per month with maintenance for man and wife three room apartment For further information please address Box 156A American College of Chest Physicians 500 North Dearborn Street Chicago 10, Illinois

Resident staff physician wanted at 200 bed tuberculosis sanatorium all forms of collapse therapy major surgery bronchoscopy Salary \$3 700 with complete maintenance For further information address Box 157A American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

Senior Staff physician and residents wanted at large tuberculosis sanatorium full time departments in pathology and thoracic surgery medical school affiliation \$4800 to \$5400 per annum complete or partial maintenance For further information please address Box 158A, American College of Chest Physicians 500 N Dearborn Street, Chicago 10 Illinois

Single physician wanted with at least three years sanatorium experience in diagnosis and treatment of tuberculosis 125 bed tuberculosis hospital in Hawaii Starting salary \$6400 00 and complete maintenance Send full credentials and available data first letter Please address Box 159A, American College of Chest Physicians 500 N Dearborn Street Chicago 10 Illinois

Expansion King County Tuberculosis Hospitals in Seattle requires additional staff Excellent facilities equipment University Medical School affiliation Young men good training Interested teaching and research preferred Chiefs of Service \$8400 Staff Physicians \$7200 Resident Physicians \$1800, plus free maintenance Laboratory Technician \$2820 X-ray Technician \$2520 Medical Record Librarian \$2400 Maintenance at cost for single persons only Write Firland Sanatorium, Richmond Highlands Washington, giving full particulars and enclose photograph

Young chest surgeon wanted to be associated with sanatorium and also do chest surgery on the outside Attractive offer For further information please address Box 155A American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

Physicians wanted at small privately endowed, Jewish institution with 25 beds one physician For further information please address Box 165A American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

Position available for physician who has had some training in thoracic surgery or is interested in learning thoracic surgery at sanatorium in northwest Salary at least \$300 per month with maintenance Opportunity to advance For further information please write Box 167A American College of Chest Physicians 500 N Dearborn Street Chicago 10 Illinois

### POSITIONS WANTED

Fellow of the College with 15 years full time hospital and sanatorium experience in tuberculosis and chest diseases desires medical directorship in progressive institution with good clinical opportunities For additional information please address Box 232A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois

Trained chest surgeon desires position as medical director of tuberculosis sanatorium or as chest surgeon For further information please address Box 233A American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

## Book Reviews

*Clinical Electrocardiography* By David Scherf, M.D., F.A.C.P., Associate Professor of Medicine, New York Medical College, Flower and Fifth Avenue Hospitals, New York, and Linn J. Boyd, M.D., F.A.C.P., Professor of Medicine, New York Medical College, Flower and Fifth Avenue Hospitals. Second edition. Price, \$8.00. J. B. Lippincott Company, 1946, Philadelphia.

The second edition of this work appears with a new page arrangement. Several suggestions seem worth offering. The discussion of the normal electrocardiogram still uses limits of normality which may be too narrow. The discussion of arteriosclerotic heart disease and myocardial infarction could be expanded. There is no unified discussion of the electrocardiographic changes during acute rheumatic fever. The chest leads are not well presented. Only leads CR2 and CR4 are utilized, and the discussion is contained in a separate chapter instead of bringing in the chest leads under each subject heading.

One of the pleasing features of the work is the effort made to correlate electrocardiographic changes with other clinical findings. The third section of the book on the services of stimulus formation and conduction is excellent and is in itself worth the purchase price.

G N A

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*Pulmonary Tuberculosis in the Adult, Its Fundamental Aspects* By Max Pinner, M.D., Chief, Division of Pulmonary Diseases, Montefiore Hospital for Chronic Diseases, New York, Editor, American Review of Tuberculosis, Clinical Professor of Medicine, College of Physicians and Surgeons, Columbia University, New York. Cloth. Price \$7.50. Pp. 579, with illustrations. Charles C. Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, Illinois, 1945.

This book is a thorough-going account of pulmonary tuberculosis in the adult. In the preface the author states that it is not a textbook. It does not attempt to tell the student how to diagnose the disease or how to treat it. It does not intend to give directions how to do this or that or the other thing in the practical performance of the clinician's duties. All this, he feels, the physician and student will find in textbooks now available. "The primary aim of this book is not to impart knowledge but to create understanding, to form rational and consistent attitudes and approaches to the problem as a whole, to provide the basically necessary foundations on which, in my opinion, the work should proceed. In order to present a consistently plausible picture it is necessary to express opinions. For better or worse, the opinions are my own. This does not mean that the opinions are original. They are not. They are a selection and a composition of the selections and opinions pronounced by many different workers."

The book contains 19 chapters, beginning with the tubercle bacillus. All phases of the disease, particularly in its pulmonary form, are presented in considerable detail. Every step in the development of tuberculosis is included from the time the tubercle bacillus first invades the tissues. Various diagnostic procedures are evaluated, and therapeutic measures and the results to be expected from them are presented. The last chapter is devoted to epidemiological principles. Like all others, this is an excellent chapter in which the available information is presented.

and the shortcomings of the various procedures are discussed. Numerous suggestions are made which should lead to more extensive observation and study. The bibliography presented at the end of each chapter is unique. Brief annotations follow each reference as time-saving directions to the reader. The bibliographies were prepared with three purposes in mind: "They provide documentation for statements made in the text, they inform the reader of opinions contrary to those expressed in the text, they are guideposts to more complete information."

This is a fine volume which can be read with profit by medical students and physicians everywhere. The publisher has spared nothing in producing a book of pleasing and dignified appearance.

J A M

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*Principles in Roentgen Study of the Chest*. By William Snow, M.D., Director of Radiology, Bronx Hospital, New York City. Published by Charles C Thomas, Springfield, Illinois.

Dr Snow has given a very readable interpretation of chest diseases and abnormal findings within the confines of the thorax. An inclusive study of the chest has, therefore, been made in a broader sense. Not only are the lung fields and pleura discussed, but the bronchial tree, the mediastinum, and the diaphragm are given good consideration.

It is commendable, in a book of this kind, that concepts in diagnosis are evaluated with physiological and pathological approaches. Hence the student may profit by a study of the book rather than consider it as an encyclopedic source used for a specific purpose.

Of special interest are the chapters discussing the "average" rather than the much-discussed "normal" chest, an evaluation of post-operative atelectasis, and the chapter dealing with special chest problems in children.

Illustrations are grouped in an atlas type of arrangement within each chapter. Comparative studies can thus be readily made. It is unfortunate that the reproductions are not as good as they might be. Reproductions of the original film on the half-tone has resulted in a contrast which is too great. Diagnostic criteria, particularly in parenchymal lesions, are "damped" out. A part of this process must of necessity occur with all films which are transformed to a new medium and reviewed by reflected light rather than as a transparency.

The short but adequate bibliography is up-to-date. More than 75 per cent of the references are taken from the literature between 1940 and 1944.

This book is a worthwhile addition to the library of student, chest physician, roentgenologist, and general practitioner.

L G I

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*The Lung*. Second Edition. By William Snow Miller, Late Emeritus Professor of Anatomy, University of Wisconsin. 222 pages, with illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1947. Cloth, \$7.50.

This book is one of the true classics in American medical literature. The author devoted 47 years to the study of anatomy of the lungs and brought to light much information which had never before been in possession of scientists and physicians. For more than 40 years Dr Miller appeared by invitation before numerous scientific and medical organi-

zations, both national and international, to present his discoveries. His presentations usually constituted the highlight of such meetings. As facts were established, his articles appeared in the best scientific and medical journals of Europe and America. The first paper was published in 1892. Dr. Miller's laboratory at the University of Wisconsin was frequented by anatomists, clinicians and others from many parts of the world. His contributions are not only of high scientific value but also of great practical importance to the clinician. For example, he showed that the flow of lymph from the lung immediately subjacent to the visceral pleura is into the pleural channels whence it is carried to the nodes of the hilum region. This in part explains the mechanism by which tuberculous pleurisy develops from primary or reinfection type of lesions located in close proximity to the pleura. Again, the detailed study of the musculature of the ramifications of the bronchi provided facts which are of value to the physician in his understanding of the mechanism of some forms of asthma as well as response to medication.

As the world's most eminent authority on the anatomy of the lung, Dr. Miller was induced to assemble his contributions of 47 years to be published as a monograph. Copies of the first edition, published in 1937, are rare and highly prized by those who have them. Second and third printings were done in 1940 and 1943, respectively. The second edition contains the same material as the first but three color plates, 20 black and white plates, and about 40 pages of manuscript have been added to the third edition which greatly enhance the value of the book. This book contains 168 illustrations, many of which are in color. It is a handsome volume, and the publisher deserves a great deal of praise for every detail required for the manufacture of this fine classic. This book should be in the laboratory of every physician.

J A M

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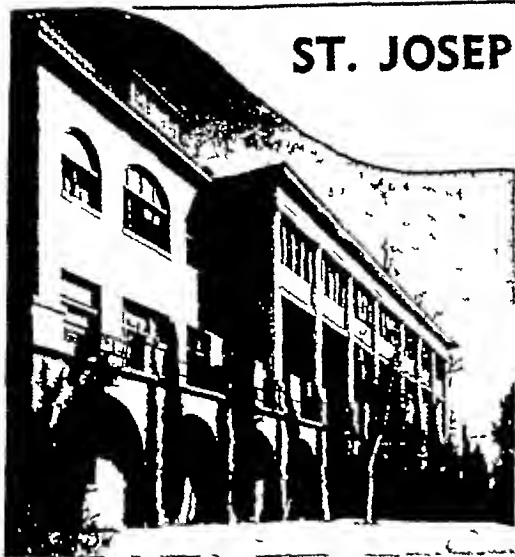
## DANIEL YELLIN

1915 - 1947

The death of Daniel Yellin on March 5th at the young age of thirty-two creates a loss to the medical profession which it can ill afford. After completing his medical schooling at the University of California, he interned in 1939 at Mount Zion Hospital. From 1939 to 1942, he was Resident of Chest Diseases in San Francisco Hospital. From 1941 to 1943 he was Medical Resident at the Hassler Health Home. He then went into private practice, achieving in four years a rather remarkable success. He not only in this short time, built a fairly large practice, but he became known to his colleagues and to the public at large as a very competent chest specialist and able physician. Quiet in demeanor, sincere and honest, he gave all he had to his patients and to his profession. Although he spent but a short time in this world in which he certainly would have succeeded magnificently, he left his mark in the hearts of his patients and friends and won the respect of his colleagues.

John C. Sharp, M.D.  
Governor for California

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FCCP

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FCCP

J W LAWS M D  
FCCP

R H HOMAN M D  
FCCP

LESLIE M SMITH M D  
FACP

*Address Sister Superior*

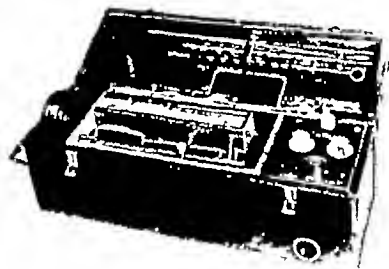
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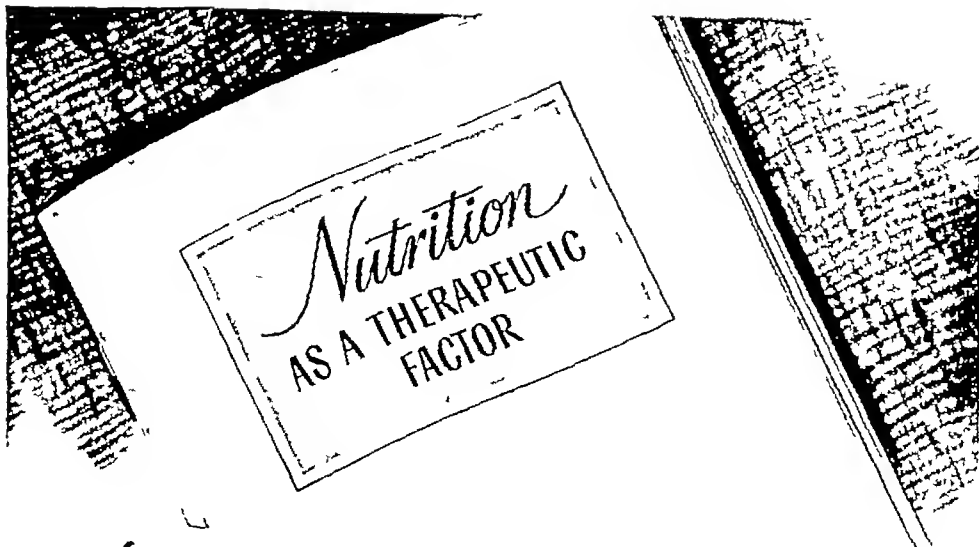
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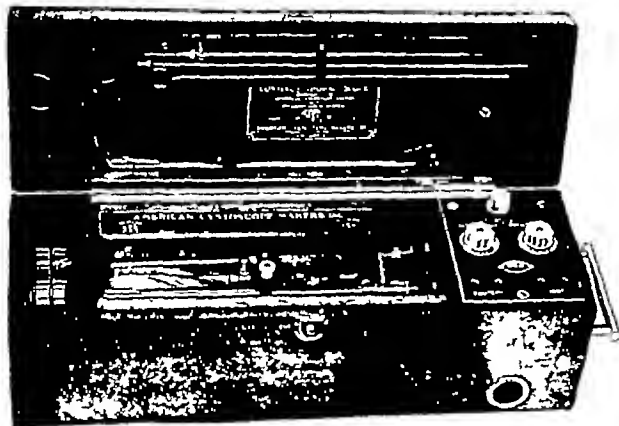
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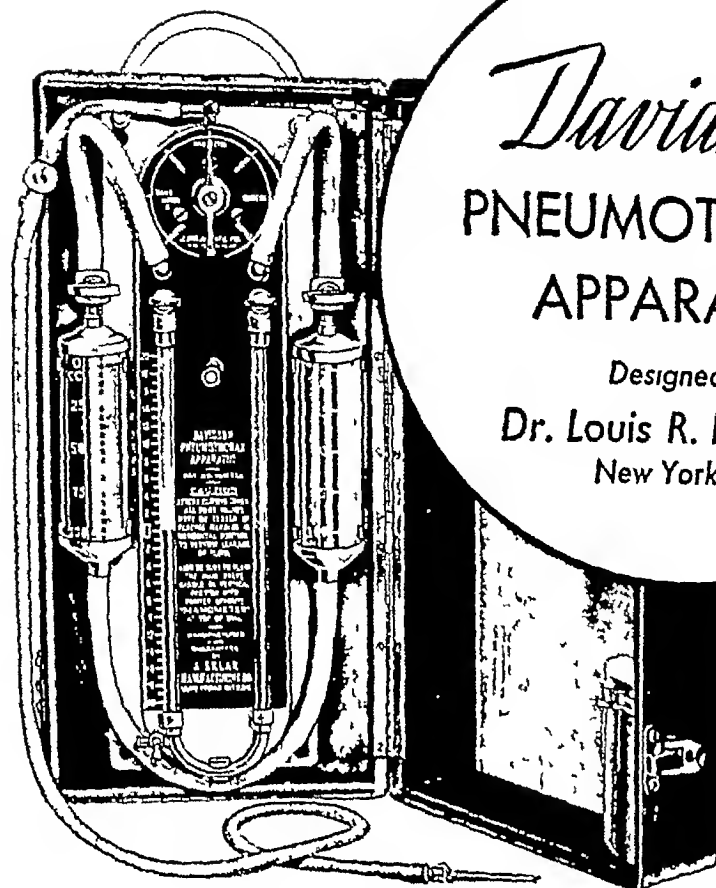
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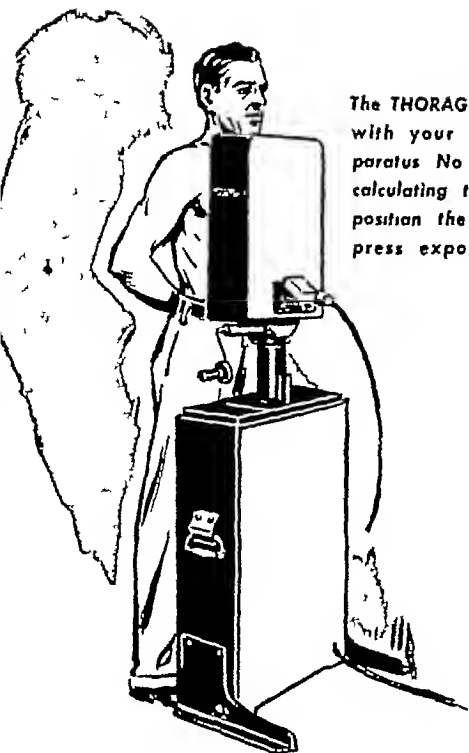
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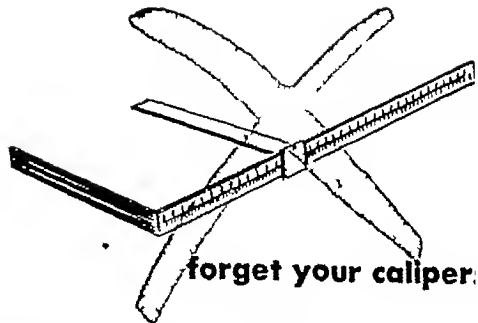
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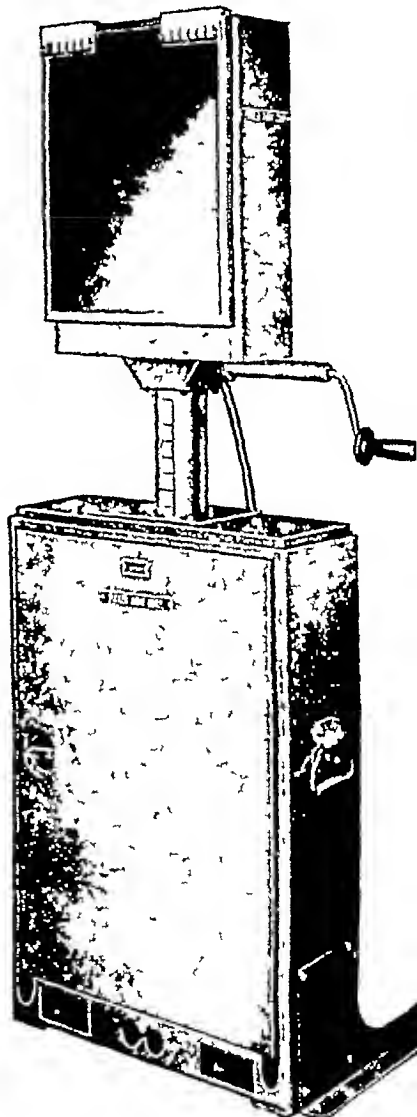
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# DISEASES *of the* CHEST

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VOLUME XIII

JANUARY-FEBRUARY 1947

NUMBER 1

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## Fifteen Years' Experience with Carbon Dioxide in the Management of Cough

ANDREW L. BANYAI, M.D., F.C.C.P., F.A.C.P.\*

*Milwaukee, Wisconsin*

Cough is one of the most frequent symptoms for the treatment of which the patient seeks medical attention. The management of a symptom apparently as simple as this is, however, fraught with a number of obstacles. First, often times it is difficult to estimate the usefulness of cough. Secondly, in many instances the potential dangers of certain types of cough are not appreciated and, therefore, are left out of consideration. Thirdly, the immediate and incentive causes of cough may not be as obvious as one would be inclined to think at first glance. And finally, a combination of various not readily recognized conditions obviates a priori a stereotyped control of this symptom.

No wonder that the justifiable lament of teachers of medicine, that the management of cough has been more of an art than a science, is being repeated and perpetuated by others. It seems to me that acquiescence is not likely to bring about constructive advances in this field. On the contrary, it seems only as a stamp of approval for using traditional methods of treatment which may not be as competent as they ought to be. It is certain, however, that if the fundamental aspects of this problem are clarified, a great deal can be gained concerning the efficient treatment of cough.

Although cough can be produced voluntarily, it is, in its spontaneous form, a reflex function of the body. Its purpose is the removal of accumulated mucus, inflammatory exudates, products of circulatory stagnation, extravasated blood, or foreign bodies from the respiratory tract and to rid the body from irritation of

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\*From the Muirdale Sanatorium, Wauwatosa, Wisconsin, and from the Department of Medicine, Marquette University Medical School, Milwaukee, Wisconsin.

any sort which originates in the air passages Its most frequent sources are diseases of the lung, the throat and the heart For the intelligent and efficient treatment of cough it is mandatory to search for its cause and institute appropriate measures accordingly The multiplicity of lesions which may elicit cough should be recognized Pathological changes in any part of the respiratory system, whether of infectious, allergic, neoplastic or other etiology, may provoke cough

The act of coughing consists of three phases, namely the inspiratory, compressive and expulsive During the first phase an increased amount of air is inspired At the end of this phase the glottis is closed During the second phase a forced expiration takes place while the glottis remains closed In consequence of this forced expiratory effort the chest becomes smaller and the air inhaled during the inspiratory phase is compressed The consequent pressure of the air contained in the lungs below the closed glottis reaches very high levels According to Coryllos,<sup>1</sup> it may stand as high as from 80 to 100 mm of mercury above the normal atmospheric pressure Other studies revealed as high rise in the intrapulmonary pressure as 160 mm of mercury This is equivalent to an increase of about 3 lbs per square inch above atmospheric pressure One can readily visualize what a tremendous expulsive force is represented by this high pressure of the air compressed in the lung at the moment the glottis is opened This initiates the third phase of coughing The previously compressed air rushes out of the tracheobronchial tubes Rohrer<sup>2</sup> studied the velocity of air during cough in human beings and found that it varied from  $\frac{1}{2}$  to  $2\frac{1}{2}$  meters per second in the respiratory bronchioles and from 50 to 120 meters (150-360 feet) per second at the glottis

According to the concept of Jackson and Jackson,<sup>3</sup> based on their extensive bronchoscopic investigations, the mechanism of cough which results in expectoration consists of two factors 1, the blast of air ("behic blast") which is followed by the forcible expulsion of secretions from the larger bronchial tubes, and 2, the tussive squeeze which is a compression of the lung during the expiratory phase of cough The expiratory contraction of the lung forces the mucopurulent inflammatory products from the alveoli and bronchioles upward into the larger bronchi Their clear analogy relative to this item is really worth quoting "For the purpose of illustration, a lobe of a lung may be likened to a sponge partially filled with water When the sponge is squeezed, the water is forced out"

It is reasonable to assume that these forces of coughing are capable of evacuating inflammatory products or foreign bodies from the respiratory tract In case of an inflammatory disease

of the lung, such as bronchitis, pneumonia, etc., one would expect a successful drainage under the effect of cough. If this is actually accomplished by coughing, one considers the cough as useful, adequate or beneficial. There is a number of instances, however, when cough is not productive of any sputum or when the amount of sputum expectorated is much less than the coughing effort should have produced. This type of cough is customarily designated as unproductive or useless. Useless or inadequate cough may be brought about by the following circumstances:

- 1 The source of irritation which initiates the cough reflex is outside of the lung, as for instance in diseases of the paranasal sinuses, an elongated uvula, pressure on the trachea or bronchi by mediastinal inflammation, tumors or dilated blood vessels.
- 2 Non-inflammatory lesions of the bronchial tubes, such as benign or malignant tumors, may cause persistent, annoying cough without expectoration.
- 3 During the course of a great many inflammatory involvements of the bronchi or the lung parenchyma there is a phase when the formation of exudate is practically nil, nevertheless the congested state of the involved structures leads to strenuous but useless cough. One of the best examples of this is the first stage of an acute bronchitis with a so-called "dry" cough.
- 4 A frequent source of inadequate cough is any disease of the lung in which the mucoid or mucopurulent products of inflammation are so tenacious, sticky and adherent to the walls of the respiratory passages that even intense, exhaustive coughing is unable to remove them. The prototype of inadequate cough of this type is that seen in the paroxysmal stage of whooping cough.
- 5 Accumulation of too much transudation in the alveoli in heart failure may elicit coughing which is insufficient for the cleansing of the lung.
- 6 There are cases where a retention of pulmonary exudates is taking place because their removal is blocked by pathological structural changes such as the formation of bronchial strictures. Such condition often causes strenuous but ineffective coughing.
- 7 Atelectasis may be the source of useless cough for the reason that when the lung becomes airless distal to inflamed areas, there is no chance for the inspired air to get behind the inflammatory products which accumulate in the corresponding bronchial tubes and, therefore, it cannot be compressed and act as the normal expulsive force of coughing.
- 8 Useless cough is common in pulmonary emphysema. It is the result of a, weakening and destruction of the elastic structures of the lung, b, change in the intrapleural subatmospheric (negative) pressure so that it is near atmospheric (neutral) pressure, and c, the abnormally low (inspiratory) position of the diaphragm. In consequence of these three pathological alterations, the normal phases of coughing cannot be carried through and

cough becomes inefficient, though it is persistent and troublesome. 9 Protracted, unproductive cough may result from fatigue and exhaustion of the expiratory muscles. It is brought about by conditions where there is only slight inflammatory exudation in the lungs but the pathological changes are conducive to coughing. Such is the case in certain types of long-standing tuberculosis, and pulmonary fibrosis.

It is important to realize that oftentimes cough as a reflex mechanism is working with a high degree of failure which may be well designated as *tussic insufficiency*. Cough of this type is unquestionably a liability rather than an asset. Assuming that there is inflammatory exudation in the lungs, its removal either by resorption or by expectoration is essential for the restoration of the normal anatomical and functional status of this organ. In the presence of tussic insufficiency, an accumulation and retention of mucus and purulent exudate takes place. The stagnation of inflammatory products in the bronchi is dangerous. 1, because it may cause complete bronchial obstruction and a consequent atelectasis in the corresponding distal segment of the lung, and 2, the pathogenic microorganisms which are prevalent in the retained mucus are likely to lead to pathological changes in the surrounding bronchial walls and thus cause the development of bronchiectasis. When massive atelectasis of one lobe or multiple patchy (lobular) atelectasis develops, not only useful respiratory surface area of the lung is lost but also the atelectatic areas must be looked upon as sites of lesser resistance which favor the development of new foci of infection. New areas of disease, of course, are followed by additional production of inflammatory exudate and consequently, by increased cough. A similar vicious circle is bound to result when the bronchial wall is involved by microorganisms in the stagnating mucus. The force of the compressed air in the lung at the beginning of the expulsive phase of cough exerts a certain degree of pressure upon the bronchial walls weakened and damaged by a severe or chronic inflammation and thus dilates and deforms them. This chain of events is an important etiological item in the pathogenesis of bronchiectasis. The additional increase in cough associated with bronchiectasis thus becomes a serious problem.

*Tussic insufficiency* may entail other difficulties. Droplets of purulent, thin exudate may be sprayed from one segment of the lung to another or from one lung to the opposite side. When partial bronchial obstruction is present, it may cause a rebound of droplets of infected material and cause their settling in the deeper parts of the lung. In either instance a spread of the disease, which is the original source of the cough, may ensue. It has been recog-

nized for sometime that long-continued cough is liable to produce emphysema. This concept is clearly formulated by Christie<sup>4</sup>. He stated that in chronic bronchitis and in any other pulmonary lesion in which the patient coughs scores of times a day the excessive stress and strain, repeated over many years, causes a destruction of the elasticity of the lung tissue. When pulmonary elasticity is lost, the lung will lack its normal capacity to recoil during expiration. Consequently, the traction or suction effect of the intrapleural subatmospheric (negative) pressure maintains the lung in its inspiratory position. This is a plausible explanation of the typical emphysematous or so-called "barrel-chest". In addition to this, the negative intrapleural pressure dilates the individual alveoli by its pulling effect and thus contributes to the degeneration and rupture of interalveolar septa and to the formation of superficial emphysematous bullae. The greater the dilatation of the lung the closer the intrapleural subatmospheric pressure will approach the atmospheric level. This, in turn, implies a deficient function of the lung the consequences of which are the persistence and incompetency of coughing in emphysema. It can be seen from this sequence of events that protracted, useless cough is a self-defeating act.

*Tussic insufficiency* associated with severe coughing interferes with the rest of the patient and with the rest of the lungs. It is a matter of common knowledge that pulmonary rest and relaxation are the cardinal prerequisites of the treatment of tuberculosis. For this reason the harmful effect of inadequate cough in this disease requires no further elucidation. Also, it is known that protracted, hard cough in pulmonary tuberculosis may accelerate the development of specific laryngitis. Pulmonary hemorrhage may be initiated by excessive, strenuous cough. Other possible disagreeable sequelae of severe coughing include spontaneous pneumothorax, vomiting, loss of appetite, exhaustion, headache, insomnia, rise in temperature, marked dyspnea, cyanosis, thoracic pain, fracture of ribs, mediastinal emphysema, subcutaneous emphysema, subconjunctival hemorrhage, urinary incontinence, and, indirectly, myocardial failure.

Reviewing these data and considering the high frequency with which useless and inadequate cough (*tussic insufficiency*) is encountered in everyday medical practice it is obvious that our efforts must be focused upon the best possible way of its treatment. With this purpose in mind, it is reasonable to say that the efficient management of cough consists of measures which are capable of removing the maximum amount of sputum with the least frequent and most effortless cough.

Reference has been made previously to the muddled state of

affairs which prevails in the treatment of this condition But how could it be otherwise if the commentary of Clark<sup>5</sup> made only a few years ago is true? He said that unfortunately the pharmacology of cough has scarcely advanced at all in the last half century Consequently, shot-gun therapy is still popular in this field, and cough mixtures tend to be very complex and completely irrational Apropos of this, I believe I am not mistaken in stating that such circumstances may explain in a large measure the success of some widely-advertised and euphemistically named pharmaceutical preparations the presumably effective constituents of which are far below the therapeutically useful level

The correction of this confused situation is attainable only through a more thorough familiarization of ourselves with pertinent physiological facts

1 The cough center is located in the medulla close to the sensory vagus center and the vomiting center It is subject to peripheral and central stimuli It is depressed by alkaloids of opium, alcoholic intoxication and full general anesthesia With reference to the suppression of cough by some of the opiates, it is well to remember that alleviation of cough in this fashion must not be interpreted as a cure of the underlying disease Such easy success does not relieve the physician of the obligation of establishing a correct diagnosis

2 Cough is provoked by the stimulation of the sensory nerve endings of the vagus and glossopharyngeus

3 The secretory function of the glands of the bronchial mucosa is increased by stimulation of these vagal nerve endings

4 There is a rich supply of smooth muscles in the wall of the bronchioles They are arranged in a circular or net-like fashion It may not be amiss to mention that about one-half of the weight of the lung tissue is made up by these muscles They have an important role in the normal functioning of the bronchial tubes Experimental observations revealed that there are a rhythmic systole and diastole of these structures Spasm of the bronchial muscles is a characteristic feature of bronchial asthma It occurs also as a result of irritation from other causes, such as the inhalation of irritant gases, fumes, and foreign bodies Bronchial spasm can easily cause complete occlusion of the smaller branches of the respiratory tract and thereby lead to dyspnea, anoxemia, atelectasis and increased cough

5 It has been demonstrated with the aid of bronchocinematography that the bronchi and bronchioles have a peristaltic motion directed from the smaller structures toward the larger ones It is maintained by the smooth muscles, and is independent from the respiratory movement of the lung The function of this peristaltic

motion is—in analogy to that of the intestinal tract—the evacuation of the bronchial contents. The normal secretion of the mucosal glands as well as inflammatory products or minute dust particles are propelled and expelled by bronchial peristalsis. Drugs of the parasympatheticomimetic group, which cause bronchospasm, also decrease or abolish bronchial peristalsis and thus deprive the lung of one of its natural protective mechanisms. The inhalation of a suitable mixture of carbon dioxide and oxygen is followed by increased peristalsis of the bronchi and the bronchioles. The increased peristalsis is attributable to carbon dioxide.

6 Another factor which is instrumental in the elimination of mucus and foreign particles from the bronchial tract is the function of the cilia. Under normal circumstances ciliary motion is active in the larger as well as in the smaller bronchi. The terminal bronchioles are not provided with cilia. The motion of the cilia is synchronized so that it is capable of driving inert material from the deeper segments of the lung toward the larynx. When a pathological process destroys the sensory nerve endings of the vagus, a cessation of the ciliary function takes place. Also, in areas where the structures of the bronchial wall are lost due to disease, the ciliary action is absent. Such is the case in bronchiectasis. The observations of Negus<sup>6</sup> on the nasal mucosa revealed that the topical application of mildly alkaline solutions of magnesium (pH 8 - 8.5) stimulates ciliary motion. On the other hand, acids paralyze it. In view of this, one could conjecture that some of the benefits derived from the administration of alkaline salts in cough may be due to their effect upon the cilia.

7 Gordonoff<sup>7</sup> considers the kinetic force of the respiratory air a contributory factor in removing secretions and products of inflammatory exudation from the alveoli to the smaller bronchi. Partial bronchial obstruction or spasm of the smooth muscles, which is particularly effective in the terminal bronchioles, interferes with or eliminates this force entirely from the corresponding area of the lung.

8 Also there exists a force of the secreted bronchial mucus which maintains a slow but continuous motion toward the tracheal bifurcation. Diseases or drugs which exert an unfavorable influence upon the consistency or the amount of bronchial secretions are likely to upset this process. Such may be the case when prescribing morphine as a cough sedative, for it is known that morphine suppresses normal bronchial secretion.

9 A great many experimental and clinical studies concerning the efficacy of various expectorants are open to criticism because their conclusions were based on measuring the amount of bronchial secretions expectorated or otherwise collected. The weakness of



these data lies in the fact that the resorption of some of the bronchial secretion by the bronchial mucosa itself was left out of consideration. Unquestionably, under favorable circumstances a portion of the bronchial secretions is resorbed by the mucosa. Gordonoff<sup>7</sup> pointed out that the scanty, thick secretions of the alveoli are made resorbable either by a process of digestion in the alveoli themselves or by a dilution and liquefaction through the admixture of secretions of the glands of the bronchial mucosa.

10 In addition to the capacity of the bronchial mucosa to resorb exudates and minute foreign particles, a similar process is being carried out in the alveoli. No doubt these two pathways of elimination are of tremendous importance in ridding a diseased segment of the lung of increased and pathological elements. The resorptive capacity of the lung tissue can be effectively increased by certain medicinal measures.

11 The role played by the respiratory motion of the lung in the removal of inflammatory products from the bronchi is not sufficiently appreciated. Under normal circumstances the inspiratory expansion of the chest wall is associated with an increase in the negativity of the intrapleural negative pressure. This, in turn, causes a stretching and dilatation of the bronchial tubes. These rhythmically repeated motions tend to remove the bronchial contents mechanically. Liquid material is thus readily propelled and tenacious, adherent mucus is separated from the bronchial wall and expelled. This expulsive force is greatly reduced or entirely missing in superficial respiration because the stretching and dilatation of the bronchi are absent. Patients who are debilitated, those under the effect of general anesthesia following major surgery, and some in whom the respiratory center is depressed by narcotics, particularly morphine, may show evidence of insufficient respiratory excursions of the chest. Henderson<sup>8</sup> emphasized the significance of anoxemia in this respect, stating that oxygen deficiency, if at all intense, acts as a sort of whip, which excites respiration to activity and even to excessive activity, but injures at the same time and is liable to be followed by a subsequent period of depressed breathing. The dangers inherent in the retention of inflammatory exudates in the lung (possible atelectasis, bronchopneumonia, bronchiectasis, dyspnea, increased cough) call for immediate measures which are capable of restoring the normal self-cleansing function of the lung. The sovereign remedy of such condition is the inhalation of a mixture of carbon dioxide and oxygen. Its effectiveness is attributable partly to the fact that carbon dioxide is a powerful respiratory stimulant and induces increased inspiratory movements of the thorax which, in turn, cause a stretching and dilatation of the bronchial tubes.

12 It is of more than academic interest to remember that the presence of inflammatory products in the smaller bronchi does not, as a rule, elicit cough irritation, or when it does so, the consequent cough is feeble and inadequate. The fluoroscopic studies of Reinberg<sup>9</sup> revealed that secretions in the peripheral bronchial tree produced no cough in bronchi of the fifth, fourth and third order. Brown and Archibald<sup>10</sup> recorded their observations while operating under local anesthesia upon a patient with a long-standing pulmonary abscess, in the base of which there opened a number of bronchi and bronchioles. They found that cough was readily initiated when a probe was inserted into one of the larger bronchi, while a similar procedure was without effect in the case of bronchioles. Also Jackson<sup>3</sup> observed during bronchoscopic examinations that the finer subdivisions of the tracheo-bronchial tree and the alveoli showed decidedly less cough production from instrumental contact than the larger bronchi. When a pathological process is localized predominantly to the bronchioles, as is the case in acute bronchiolitis, the accumulation of secretions may lead to considerable respiratory distress, anoxemia and cyanosis. In the absence or insufficiency of cough in these cases, therapeutic intervention is imperative for draining the small bronchi and bronchioles and for the relief of the patients' distress. The method applied must not increase the accumulation of exudate. The administration of a mixture of carbon dioxide and oxygen is the measure of choice.

I have been administering carbon dioxide as an expectorant since 1930. Its administration is a simple and safe procedure which does not interfere with the comfort of the patient. In my experience it proved to be a most efficient expectorant. The benefits derived from its use are noticeable subjectively and objectively: (a) spells of strenuous, exhausting coughing are prevented and thereby rest is secured for the patients and particularly for the lungs, (b) an unproductive cough is transformed into a useful one, (c) directly after inhalation the amount of expectorated sputum is increased and its character changes from a heavy, thick and tenacious type into a thinner, serous and more watery kind, (d) the use of expectorant drugs and narcotics can be reduced.

In addition to its previously mentioned pharmacological actions, carbon dioxide is a good expectorant 1, because it stimulates the myo-elastic structures of the lung and causes a forceful peristaltic movement of the bronchi, and 2, because it liquefies mucopurulent inflammatory exudates that stagnate in the bronchial tract.

Miescher<sup>11</sup> in 1885 called attention to the importance carbon dioxide plays in respiration and formulated the aphorism "Over

the oxygen supply of the body carbon dioxide spreads its protecting wings" This was followed in 1905 by the experimental work of Haldane and Priestly<sup>12</sup> who actually demonstrated that the carbon dioxide of the blood normally controls respiration They observed that an increase of the carbon dioxide in the pulmonary alveoli was consistently accompanied by an increase of the respiration As low as a 1 per cent increase was sufficient to stimulate the respiratory center and to cause deeper breathing Hill and Flack<sup>13</sup> reported that the inhalation of increasing concentrations of carbon dioxide caused a proportional stimulation of the respiratory center until 10 per cent was reached, higher concentrations led to a progressive depression of respiration Brown<sup>14</sup> found that the maximum stimulation of pulmonary ventilation was reached at 10.4 per cent carbon dioxide The greatest protagonist of the clinical application of carbon dioxide was Henderson,<sup>8</sup> who with Haggard and other associates made numerous contributions to the medical literature on the practical value of this method of treatment They used it for controlling the paroxysmal stage of whooping cough, for the prevention and treatment of postoperative massive atelectasis and pneumonia and for the management of a number of other conditions in which the respiratory center is depressed

Short inhalations of 5 to 10 per cent carbon dioxide with ample oxygen induce no ill effects The most conspicuous manifestation of their influence is an increase in the respiratory minute volume In a self-experiment with 10 per cent carbon dioxide and 90 per cent oxygen, taking 6 liters per minute through a well-fitting face mask my respiratory rate rose from 14 per minute before the inhalation to 19 at the end of a fifteen minute observation period Henderson,<sup>8</sup> using 5 per cent carbon dioxide, found that the volume of breathing increased more than threefold Also, marked augmentation in the respiratory minute volume was recorded by Heller and his associates,<sup>15</sup> Barcroft and Margaria,<sup>16</sup> Hitzenger<sup>17</sup> and Grueneberg and Viethen<sup>18</sup> The effect usually becomes noticeable during the first minute of inhalation Brief interruptions render the respiratory center more sensitive Carbon dioxide causes one to breathe not only more times per minute but also with fuller lungs It quickens the rate both of the air inhaled and of the air exhaled There are considerable variations in the same person on different days Some persons show only slight increase in minute volume to 5 per cent, even to 7 per cent carbon dioxide

Hartl<sup>19</sup> found that oxygen intake is increased at the beginning of the inhalations, it may remain the same or may decrease during the treatment Saklad<sup>20</sup> observed that when normal oxygenation was accomplished in anoxic patients, the respiratory rate di-

minished The experimental studies of Prinzmetal<sup>21</sup> revealed that the increased respiratory motions of the chest during carbon dioxide inhalations are associated with a greater negativity of the intrapleural pressure on inspiration and a reduced negativity on expiration, both these changes contribute effectively to a competent diastole and systole of the lung Henderson<sup>8</sup> postulated an increase in the tonus of the respiratory muscles of the chest, particularly the diaphragm, and of the myoelastic structures of the lung during carbon dioxide inhalations The latter assumption was proved to be correct by the clinical observations of Brunn and Brill<sup>22</sup> They studied the effect of carbon dioxide during bronchoscopy and noted that it induced violent movements of the bronchial tree and alterations in the shape of its branches consequently bronchial secretions spilled from minor into major bronchi

The inhalation of 1 to 8 per cent carbon dioxide improves the functional capacity and the ventricular output of the heart,<sup>17</sup> also it increases both the systolic and the diastolic blood pressure<sup>23</sup> and is followed by an increase in the pulse rate and in the pulse pressure, particularly after the concentration of carbon dioxide has reached 3 per cent<sup>24</sup> Tomaszewski and his co-workers<sup>25</sup> administered 8 per cent carbon dioxide to healthy persons, and they found, besides the respiratory changes, a slight increase in the metabolism and an initial quickening and then slowing of the pulse No increase in the metabolic rate was noted by other investigators Fuchs<sup>26</sup> observed that a slight increase in the blood carbon dioxide accelerated clotting, while too much carbon dioxide in the plasma caused prolonged coagulation Tannenberg<sup>27</sup> considered this accelerated clotting an indirect transient effect of carbon dioxide on the peripheral and central nervous system that leads to an enlarged production of epinephrine

I have made observations on 40 patients concerning the respiratory pattern during carbon dioxide inhalation All of them were given inhalations as a therapeutic measure for the treatment of otherwise uncontrollable cough and dyspnea The patient was seated on a chair, and the technic and purpose of the procedure was explained to remove fear or apprehension After the determination of the respiratory rate and pulse rate in this position, from two to five counts were taken during a ten to fifteen minute period of inhalation of the gas mixture Ten of the 40 patients took the treatment with the aid of a face mask, by the closed method, the others inhaled the gas through a glass tube In the latter cases the patient was instructed to hold the end of the glass tube in his mouth, to inhale the gas coming from the tank and to exhale through the nose Although the admixture of air with and dilution

of the inhaled gas was unavoidable, judging from the therapeutic response this method of administration proved to be satisfactory. Altogether 275 observations were analyzed 17 treatments by the closed method and 258 treatments by the open method (through a glass tube)

By the closed method the amount of gas delivered to the patient varied from 4 to 6 liters per minute. The anticipated response to such high concentrations of carbon dioxide was an increase in the respiratory rate. Still, we found this in 3 instances only. The respiratory rate remained unchanged in 3 and decreased in 9 observations. This is at variance with findings in normal persons and can be explained (1) by the reinflation of previously atelectatic areas of the lung with a consequent immediate relief from dyspnea and (2) by the increase in the amplitude rather than in the rate of respiration. In 2 instances the rate dropped in four minutes from 26 to 14 and from 24 to 10, respectively. In 2 patients an initial decrease in the rate was followed by a moderate increase toward the end of the treatment.

With the open method the pattern of respiratory response was similar to that found with the closed method.

Of the 258 observations with the open method, 4 liters of the gas mixture per minute were given in 8 instances, 4.5 in 9, 5 in 181, 5.5 in 3, 6 in 9, 6.5 in 9 and 7 in 39.

At the end of the inhalations the number of respirations was increased in 89 instances. The increase varied from less than 10 per cent to 60 per cent of the initial rate, the great majority showing a rise less than 30 per cent. In 93 instances the number of respirations was decreased, the reduction varied from less than 10 per cent to 42.6 per cent, it was less than 20 per cent in 79 instances.

The initial respiratory rate varied between 16 and 40, the great majority were between 20 and 29. There was a group of observations in which during the inhalation of carbon dioxide the respiratory rate first decreased and then increased, in another group an opposite response was recorded. In cases in which the rate at the end of the observation period was the same as the original rate, there was an intermediate decrease in 27, or 35.5 per cent, and an intermediate rise in 15, or 19.7 per cent. In the group with a final reduction in the respiratory rate an intermediate increase was noted in 31, or 33.3 per cent. In cases in which the final respiratory rate was elevated, an intermediate decrease was seen in 6, or 6.7 per cent. The intermediate increase varied from less than 10 per cent to 60 per cent of the initial rate, the great majority showing a rise between 10 and 29 per cent. The intermediate decrease varied from less than 10 per cent to 42.6 per cent of the

initial rate, the great majority falling between 6 and 19 per cent

It is interesting to note that the final respiratory rate was the same as the initial rate in 76 instances, or 29.5 per cent, and it was less than the initial rate in 93, or 36 per cent. Altogether, the final rate remained unchanged or was reduced in 169 instances, or 65.5 per cent, as against 89 instances, or 34.5 per cent, in which the respiratory rate was increased at the end of the inhalation of the gas mixture.

The apparatus used in my work consists of a tank, containing a mixture of 10 per cent carbon dioxide and 90 per cent oxygen or of 5 per cent carbon dioxide and 95 per cent oxygen, mounted on a small platform on casters that makes it possible to give the inhalations to a number of bed patients. Originally, I used an ordinary mask used for general anesthesia, more recently the B L B mask has been found preferable. An oxymeter regulates the flow of gas per minute. The inhaler is connected to the tank by a rubber tubing. A rubber bag which serves as a small reservoir is attached to the inhaler. In some patients it may be expedient to give the inhalations through a glass tube instead of a mask either because they may be reluctant to accept the mask, or the respiratory stimulation is too strong from the inhalation of 10 per cent carbon dioxide. It is fully realized that when the inhalations are administered through a glass tube held in the patient's mouth, the admixture of air and dilution of carbon dioxide take place, but the results by this so-called open method are quite satisfactory. The open method is recommended for patients who are markedly debilitated or who show some of the possible side-effects when the closed method is used. All patients taking 5 per cent carbon dioxide and 95 per cent oxygen use the closed method (B L B mask).

It is a good policy to explain to the patient briefly the mode of action of the gas inhaled, and the expected changes in respiration, and the probable subjective symptoms. After proper instructions, inhalations through a glass tube can be administered without constant supervision, however, it is the responsibility of the nurse to regulate the flow of the gas, and time of the treatment. As a rule, the meter is set to 4 to 5 liters per minute for closed inhalations and to 5 to 7 liters per minute for the open method. The length of each treatment varies from 5 to 15 minutes, and the inhalations are administered once, twice, or three times a day. It is necessary to observe the patient closely during the first treatment. His respiratory response and subjective reactions determine the conduct of further treatments. They are conscious of breathing deeper and subsequent to the treatment they describe their experience in such terms as "the chest feels clear and cool".

and "the chest feels so much lighter" If it is noted that the respirations become too strenuous, the inhalations should be given with brief (1 minute) interruptions In rare instances, when the closed method is used, it may be necessary to reduce the flow to less than 4 liters per minute Most patients appear quite comfortable, as if in euphoria The latter can be explained (1) by the presence of 90 per cent oxygen in the gas mixture that is bound to counteract anoxemia, (2) by loosening up mucopurulent bronchial plugs and obstructive sticky, tenacious inflammatory exudate the access of air is secured to underinflated regions of the lung, (3) by increased inspiratory expansion of the chest wall and by increased descent of the diaphragm atelectatic areas are stretched out and become aerated In some of my patients I noted some transient minor side-effects of carbon dioxide inhalations, such as hot sensations, palpitation, weakness, frontal headache and slight dizziness None of these symptoms interfered with the treatment when proper adjustments were made in the method of administration In the beginning, the treatments are given daily, subsequently, the frequency of inhalations can be reduced, depending upon the relief obtained Some patients are obliged to take them daily for an extended period of time, while in others the interval between inhalations can be increased to a week Carbon dioxide is an effective therapeutic agent, and in its use utmost individualization is required

The prompt relief obtainable by this treatment is best expressed in the comments of patients "the cough is not so dry, it is loose," "the cough does not jar me any more," "the cough is less, and not tight as before," "I do not have to exert myself when coughing," "I have no more dry spells of coughing," etc

I have noted that following inhalations the amount of expectorated sputum is greater than before treatment, and also that adequate evacuation of the bronchi insures for the patient comparatively long periods of rest free of the annoying cough Incidental by-effects of the satisfactory pulmonary drainage by carbon dioxide are relief from dyspnea, undisturbed sleep during night, and improvement in the general subjective feeling Often patients remarked how a feeling of pressure and heaviness was relieved by the treatment, that following inhalations their chest felt freer "like a loose sponge," and how much easier they were able to move about Also I have noted the disappearance of chest noises and pharyngeal cough irritation

When satisfactory evacuation of the bronchi has been accomplished, the amount of sputum becomes gradually less, unless further mucopurulent accumulation takes place during the interval

between treatments. It can be seen, therefore, that the frequency of inhalations and gas flow per minute have to be individualized and adapted to the changing requirements of the patient. I have found that the inhalation of carbon dioxide not only alleviates distressing cough but also enables one to reduce the consumption of narcotics and expectorant drugs.

The recent painstaking investigations of Basch, Holinger and Poncher<sup>28</sup> concerning the effectiveness of carbon dioxide and of the commonly used expectorants confirm our own clinical findings. They studied the influence of ammonium chloride, potassium iodide, fluid extract of senega, fluid extract of ipecac, and emetine hydrochloride, and compared it with the effect of carbon dioxide. They found that carbon dioxide acts as a real expectorant by diluting the sputum—that is, by lowering its viscosity and reducing its solid contents. They state that in comparing the physical and chemical properties of the sputum after the use of carbon dioxide inhalations with the same properties after the administration of drugs one at once realizes the greater liquefaction of the sputum caused by carbon dioxide. "since in this treatment there is no interference with the chemical properties of the sputum through the secretion of the administered drugs into it, the dried residue, the amount of ash and the total nitrogen content are regularly markedly lowered."

Striking results were observed by Allison<sup>29</sup> following the inhalation of carbon dioxide and oxygen in the treatment of acute bronchitis of infants and children. Satisfactory symptomatic relief was seen in bronchial asthma by Tiefensee,<sup>30</sup> Hurst<sup>31</sup> and Campbell and Poulton.<sup>32</sup> Gratifying symptomatic improvement was recorded in bronchopneumonia and in pneumonia in children by Gruenberg and Viethen,<sup>18</sup> and by Allison.<sup>29</sup> This procedure can be used with safety in bronchopulmonary infection of any etiology, including tuberculosis.

As to the selection of cases for this treatment, it is indicated whenever there is an accumulation and retention of inflammatory exudate in the bronchial tract and its evacuation—in spite of strenuous cough—is inadequate.

There are patients who should not be given this treatment: (1) patients with recent pulmonary hemorrhage, (2) those with marked emphysema, (3) when widespread pulmonary fibrosis is present without atelectasis, bronchiectasis or mucopurulent retention in the air-passages, (4) cases of acute plastic pleurisy and pleurisy with effusion, (5) hypertensive patients, and (6) when the cause of cough is outside of the lungs.



## CONCLUSIONS

1 The rational management of cough depends upon its nature, origin, and upon the associated clinical findings

2 Cough which originates from the lung may function with a high degree of failure (tussic insufficiency)

3 Ineffective cough harbors a number of potential dangers and, therefore, it should be corrected

4 Suppression of the cough by depressing the cough reflex by narcotics, though easy to do, does not necessarily mean adequate treatment. As a matter of fact, there are a great many instances when the administration of narcotics may do more harm than good

5 Unproductive cough may coexist with an accumulation of inflammatory exudate in the lower air passages

6 No patient should be permitted to become exhausted under the strain of incessant coughing or to drown in his own accumulated pulmonary secretions

7 Whenever considerable inflammatory exudate is present in the bronchopulmonary tract, relief from cough is best brought about by the adequate evacuation of these structures

8 Drugs prescribed for the cleansing of the bronchi and alveoli should be selected according to the individual requirements of the case

9 Expectoration is not the only means for the elimination of inflammatory exudates from the lung. Large amounts of the exudate are resorbed from the respiratory tract under favorable circumstances

10 Clinical observation of others as well as my own experience have convinced me that carbon dioxide is a most efficient expectorant. It is superior to medicinal doses of potassium iodide, senega, ipecac and emetine hydrochloride. It is much better than steam inhalation. It aids the cleansing of the lungs both by facilitated expectoration and by pulmonary resorption

11 When it is used as an expectorant, one can administer a mixture of 5 per cent carbon dioxide and 95 per cent oxygen, or 10 per cent carbon dioxide and 90 per cent oxygen. The strength of the gas mixture and the timing of its inhalation should be adjusted to the individual patient

12 It is of advantage to combine carbon dioxide inhalation with steam inhalation

13 Postural drainage may be instituted after the inhalation of carbon dioxide for the rapid evacuation of the respiratory tract

14 Carbon dioxide by inhalation is given only as a symptomatic measure and it must not exclude specific drugs or accepted methods of treatment

## CONCLUSIONES

1 El tratamiento racional de la tos depende de su naturaleza, origen y hallazgos clínicos concomitantes

2 La tos que se origina en el pulmón puede fracasar en su función (insuficiencia de la tos)

3 La tos ineficaz fomenta un cierto número de peligros potenciales y, por lo tanto, debe ser corregida

4 La supresión de la tos mediante la depresión del reflejo de la tos por narcóticos, aunque fácil de lograr, no es necesariamente un tratamiento adecuado. En realidad, hay muchas ocasiones en las que la administración de narcóticos puede causar más mal que bien

5 La tos improductiva puede coexistir con una acumulación de exudado inflamatorio en las vías respiratorias inferiores

6 No se debe permitir que ningún enfermo se agote debido al esfuerzo excesivo de una tos incesante o que se ahogue en la acumulación de sus propias secreciones pulmonares

7 Cuando quiera que exista una cantidad considerable de exudado inflamatorio en las vías broncopulmonares, la mejor manera de aliviar la tos es mediante la evacuación adecuada de ese material

8 Las drogas que se receten para limpiar los bronquios y los alvéolos deben ser escogidas de acuerdo con los requisitos individuales del caso

9 La expectoración no es el único medio de eliminar los exudados inflamatorios del pulmón. Cuando las circunstancias son favorables se reabsorben grandes cantidades del exudado en las vías respiratorias

10 La observación clínica de otros, así como mi propia experiencia, me han convencido de que el anhídrido carbónico es un expectorante de lo más eficaz. Es superior a dosis medicinales de yoduro de potasio, sénéga, ipecacuana e hidrocloreto de emetina. Es mucho mejor que la inhalación de vapor, y ayuda a limpiar los pulmones, tanto porque facilita la expectoración como por la reabsorción pulmonar

11 Cuando se usa como expectorante, se puede administrar una mezcla de 5 por ciento de anhídrido carbónico y 95 por ciento de oxígeno, o 10 por ciento de anhídrido carbónico y 90 por ciento de oxígeno. La concentración del gas en la mezcla y la regulación del tiempo de inhalación deben ser adaptados a cada paciente

12 Es ventajoso combinar la inhalación del anhídrido carbónico con inhalación de vapor

13 Puede instituirse el drenaje de postura después de la inhala-

ción del anhídrido carbónico para facilitar la evacuación rápida de las vías respiratorias

14 Se emplea la inhalación del anhídrido carbónico solamente como medida sintomática y no a exclusión de drogas específicas o de tratamientos aceptados

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# Surveys, B C G , Social Insurance and Health Card as Part of the Tuberculosis Control in Asuncion, Paraguay

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In July 1941, we started out in the organization of the Prophylaxis Section of our Tuberculosis Dispensary By means of a thorough newspaper campaign, we were able to start our task by examining the near relatives of consumptive persons, of others who came to us by their own free will in a somewhat irregular manner, and the staffs of some public firms and private concerns, whose heads realized the importance of the work we proposed to carry out In November 1941, the Ministry of Public Health realized the possibility of carrying out a collective examination It amplified a law as of 1938 enforcing the use of the Health Card

to make x-ray examination of the lungs obligatory for all public officials, public and private employees, teachers, students, professionals, as well as to those people who are about to travel

Up to the time of writing this report we have taken x-ray photographs of 120,000 persons (1941-1946) The examinations consist of a tuberculin reaction, an x-ray photograph of the lungs and a brief exploration of the skin and mucous membranes Occasionally and always with an investigational point of view in mind, biotypological data are taken such as complexion, height, weight, chest circumference, etc Last year (1945) we have also given attention to the physical exploration of the abdomen B C G vaccination is given to all those persons who are tuberculin negative

We can examine with ease 200 persons in three hours and the results of these examinations are delivered 48 hours later In this lapse of time, it is possible to examine the x-ray photographs which were taken and to fill in the Health Card to be handed to the examined persons When damage is found to exist in the heart and main arteries, or if it is necessary to carry out a further examination of any person within a certain time, the facts are entered on the respective cards Any suspicious lesion of the lungs is checked and photographed by x-ray to make an accurate diagnosis In such cases, the laboratories are instructed to take a blood

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count, blood sedimentation rate, and to examine the sputum. Studies of the gastric contents are rarely carried out. Instead we have introduced the bronchial washings (methods of Abreu and R. Fernandez from Brazil). In this technique, the posterior pharynx is anaesthetized with 0.1 per cent pantocaine usually introduced by atomizer spray. The tongue is retracted forward and about 10 cc of saline is quickly injected into the posterior pharynx above the epiglottis. The ejected material is collected and examined for tubercle bacilli. We consider this procedure more practicable since it can be done at any time.

Those persons suffering from heart disease are urged to place themselves in the hands of private practitioners or of the public dispensaries. People suffering from lung disease are notified that they should report to the Tuberculosis Dispensary or at a hospital for treatment. When the patient is a worker or a private company employee, and he is found to be ill of tuberculosis, the Social Insurance Division is notified for the corresponding follow-up. The persons with syphilis are sent to the respective institutions for treatment. (In the finding of syphilis, the Chediack microreaction is used.) Leprosy cases are compelled to be interned in the Leprocomium at Sapucay, some fifty miles from Asuncion.

The results of our research have been printed in different publications.

### SUMMARY

A Health Institute for Individuals and Communities has been established in Asuncion to provide health cards to all persons who carry out their part in the communal activities by means of their trade or profession. In order to obtain the health card, each person pays Gs. 2 (\$ 60) and undergoes an x-ray examination, a chest examination, a tuberculin test and examination of the skin and mucous membranes. BCG vaccination is given to the tuberculin non-reactors.

Through these examinations we screen out the pulmonary, cardiac, venereal and leprosy cases. The card is not issued to people with other contagious diseases, such as, tuberculosis, syphilis in its contagious stage, leprosy, etc. In this way many people have learned for the first time that they were victims of such diseases and have promptly been treated for their respective ailments. This quick intervention and the consequent control that we exercise over the patients has allowed them to avoid what might eventually have led to irreparable damage to their health.

The Abreu method which is used is perhaps rather more expensive than the fluoroscope method but has proven to be highly superior in the number of pulmonary cases it has brought to light.

The importance of the Health Card is, therefore, herewith explained

### RESUMEN

Se ha fundado en Asunción un Instituto de Salud para Individuos y Colectividades, cuya función es proveer de tarjetas de salud a todas las personas que participan en las actividades de la colectividad por motivo de su negocio o profesión. Para obtener la tarjeta de salud cada persona paga Gs 2 (\$ 60) y es sometida a un examen radiográfico, un examen del tórax, una prueba tuberculínica y un examen de la piel y de las membranas mucosas. Se vacuna con BCG a los que no reaccionan a la tuberculina.

Mediante estos exámenes se descubren los casos pulmonares, cardíacos, venéreos y leprosos. No se les expide la tarjeta a personas que padecen de enfermedades contagiosas, tales como tuberculosis, sífilis en su período contagioso, lepra, etc. De esta manera muchas personas se han enterado por primera vez de que eran víctimas de esas enfermedades y han recibido pronto tratamiento para sus respectivas dolencias. Esta intervención oportuna y el control consiguiente que ejercemos sobre los enfermos les ha permitido evitar lo que con el tiempo habría podido causarles daño irreparable a la salud.

El método de Abreu que se emplea es, quizás, algo más costoso que el método roentgenoscópico, pero ha demostrado ser muy superior en el número de casos pulmonares que ha puesto al descubierto.

Se ha explicado, pues, la importancia de la Tarjeta de Salud

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# Diasone Therapy in Pulmonary Tuberculosis\*

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The sulfonamides have proved to be ineffective and disappointing in the chemotherapy of tuberculosis. Related chemical compounds, called sulfones, have recently been studied intensively and have been found to have therapeutic effect in experimental guinea-pig tuberculosis. The parent compound is 4,4'-diaminodiphenylsulfone. From this has been derived promin (sodium p,p'-diaminodiphenylsulfone-N,N-didextrose sulfonate), promizole (4,2-diaminodiphenyl-5'-thiazolesulfone), and diasone\* (disodium formaldehyde sulfoxylate diaminodiphenylsulfone).

It is our experience with the last mentioned drug which we now propose to report.

## *Method and Procedure*

Seventeen patients were selected for diasone therapy. Thirteen were white and four were negro. Eight patients were male and nine were female. Their ages varied from 19 to 36 years. Three had moderately advanced and fourteen far advanced pulmonary tuberculosis.

All had been at Koch Hospital for months, many for years. For the most part, conventional therapy, when indicated, had already been given. Thus, six patients had had phrenic nerve crushing, twelve one or more pneumothoraces attempted or established, and seven thoracoplasty.

Three of these patients who had had thoracoplasty were given diasone primarily because of persistently positive sputum. One patient's disease was actively spreading, and the remaining were patients who were not doing well, whose course was stationary or slowly becoming worse. All patients had a positive sputum. Most of them were on bed rest.

Our knowledge of these patients' course, our past experience with them and with patients with similar disease, we felt, were adequate controls.

Diasone was given by mouth, 33 grams three times a day with

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\*Diasone was obtained for this study through the courtesy of Dr. George R. Hazel, of the Abbott Laboratories of Chicago, Illinois.

\*\*From Robert Koch Hospital, Hospital Division, Department of Public Welfare, St. Louis, Missouri.



meals, except to one patient who received it two times daily. Only rarely was it necessary to decrease or interrupt dosage because of toxic reactions. The length of treatment varied from 64 days to 387 days, the average being 202 days.

An x-ray film, physical examination of the chest, complete blood count, sedimentation rate determination (Wintrobe-Landsberg), and urinalysis were done prior to diasone therapy on each patient. During administration of the drug, a complete blood count, sedimentation rate determination, urinalysis, and diasone blood level determination were done weekly on each patient. X-ray films were taken at frequent intervals.

*Results* A review of all cases after a course of diasone therapy showed

No change	5 cases
Worse	6 cases
Died	1 case
Improved	5 cases

Three of the cases listed as worse later died, 102 days, 51 days, and 18 days subsequent to the discontinuation of the diasone. These patients had received diasone for 125 days, 106 days, and 64 days, respectively.

The following is an analysis of the cases which, in some way or another, seem to have shown some improvement.

1 Patient V V, a 38 year old white male, whose pulmonary tuberculosis was diagnosed Far Advanced II on admission. There was bilateral cavitation. A left pneumothorax and intrapleural pneumonolysis were followed by a right thoracoplasty. Subsequently the left pneumothorax was lost, but the patient improved, and was started on exercise. While on exercise, the left lung showed increased disease. The patient was then given diasone. Five months after diasone was begun the patient had a hemoptysis. An emergency pneumoperitoneum was instituted. The patient has done fairly well since then. There is some improvement on x-ray. The sedimentation rate has dropped from 24 mm (corrected) to 13 mm (corrected). The Schilling differential count has remained about the same. There has been no fever. The sputum remains positive. The improvement here is only slight, and might be due to the pneumoperitoneum.

2 Patient H C, a 33 year old male, whose pulmonary tuberculosis continued to spread despite a left pneumothorax, which was ineffective, and a left phrenic nerve crushing. After the first stage of thoracoplasty, his disease spread to the right lung, necessitating delay in thoracoplasty. He was then given diasone. Subsequently he improved, and thoracoplasty was completed while he was receiving diasone therapy. Since then his improvement has been definite, but this may be due, at least in part, to the thoracoplasty.

3 Patient D S, a 25 year old negro male, who had had a right thora-

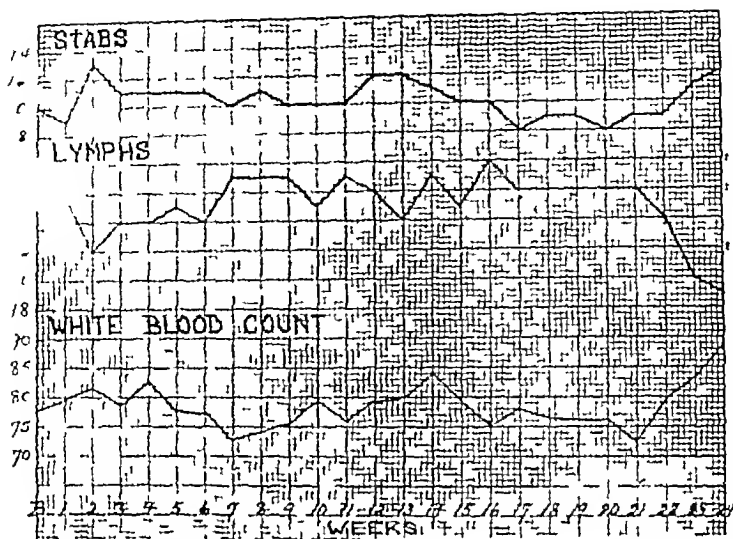


Figure 1 A composite graph of the "stablernige" cells, lymphocytes and the white blood counts of all patients taken weekly. In the case of the stabs and lymphocytes the figures in the ordinate represent percentages and in the white count hundreds per c.mm.

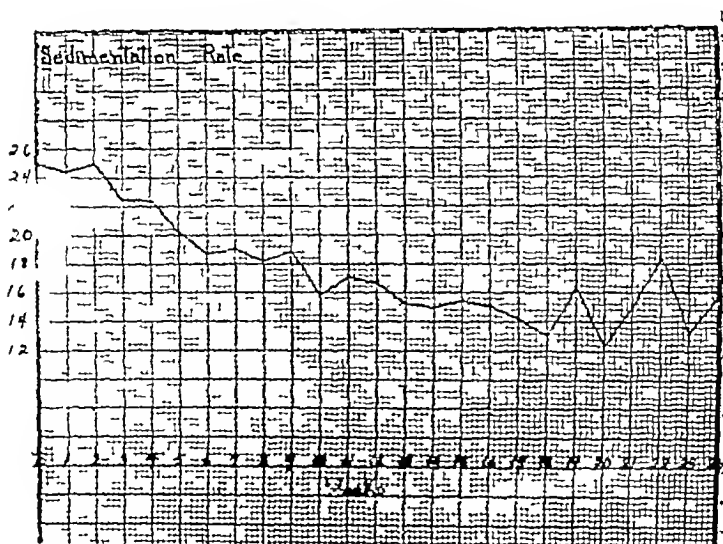


Figure 2 A composite graph of sedimentation rates in mm per hour (Wintrobe-Landsberg) of all patients taken at weekly intervals.

coplasty, but whose sputum remained persistently positive. Bronchoscopy in July, 1944 revealed the presence of tuberculous ulcerations of the left main bronchus, which were cauterized with 30 per cent silver nitrate. Diasone therapy was then begun. In the following October, one sputum specimen was positive out of 10, and in December, 1944, ten sputum examinations were negative. Bronchoscopic examination at this time, however, showed that extensive ulceration of the left main bronchus was still present. Diasone was then discontinued. The ulcerations were then repeatedly cauterized with 30 per cent silver nitrate. Later bronchoscopic examinations showed some improvement. Sputum examinations have continued to be negative.\*

4 Patient A W, a 33 year old white female, who had a left phrenic nerve crush followed by a right pneumothorax. The latter had to be discontinued because of dyspnea. At the time that diasone was first given, there were heavy infiltrations bilaterally, a large cavity on the left below the clavicle, and a shallow cavity on the left at the level of the fourth interspace anteriorly. After a course of treatment with diasone, the cavity in the left apex became smaller, but the cavity in the left mid-lung field became larger. In general, however, the entire picture appeared somewhat improved.

5 Patient M L, a 40 year old white female, diagnosed on admission as pulmonary tuberculosis, Far Advanced, II, with bilateral cavitation. Cholecystograms demonstrated the presence of gallstones. Following administration of diasone, she felt subjectively stronger and gained 16 pounds. There has been only a small amount of bilateral improvement on x-ray examination, however, and there is one new area of involvement in the left apex which appeared during treatment. There has been a change in the Schilling differential count, from 2 stab forms and 21

\*Since this paper has been written, this patient has again developed positive sputum, approximately 8 months after discontinuing diasone.

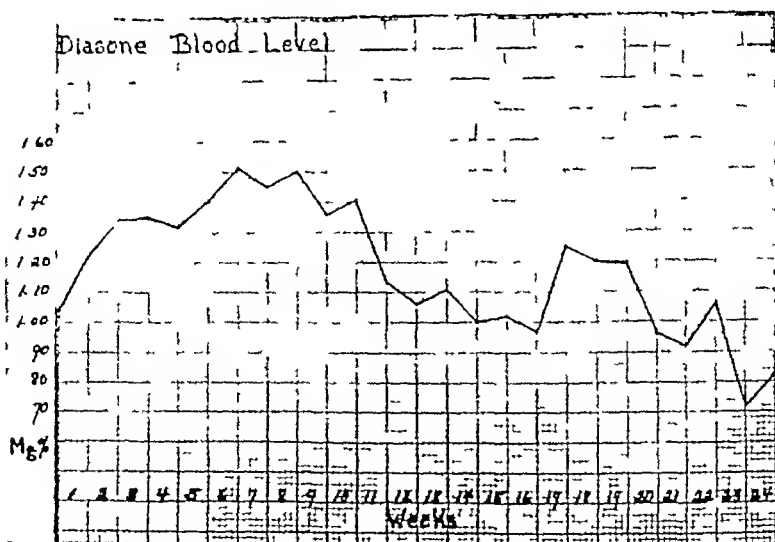


Figure 3 A composite graph of diasone blood levels taken on all patients at weekly intervals

lymphocytes before diasone to 8 stab forms and 26 lymphocytes after diasone. The sedimentation rate has dropped from 46 mm to 32 mm (corrected). It seems to us that the curve of her improvement has recently levelled off.

Figure 1 is a composite chart, showing the variation in stab forms, lymphocytes, and the white cell count on all patients under therapy. There seems to be no definite trend in any one direction.

Figure 2 is a composite chart showing the improvement in sedimentation rate. This is definite, and often, it appears to us, is out of proportion to the actual improvement in the patient.

Figure 3 is a composite chart showing the variation in the diasone blood level. For the most part, the levels were between 1.0 and 1.5 mg per cent. These are about the same levels obtained by Petter and Prenzlau<sup>5</sup> and Benson and Goodman.<sup>6</sup>

### Toxicity

The most consistent toxic effect of diasone was the development of anemia (Fig. 4). The average red cell count before diasone therapy was 4,348,000 per c mm. At the fifth week after diasone therapy the average red cell count was 3,760,000. This is an average loss of 588,000 red cells per c mm. Following this, there was a slow recovery which almost, but not quite, reached the level before drug therapy was begun.

The curve of hemoglobin (Sahli) followed that of the red blood count.

The next most common toxic effect was cyanosis, which was

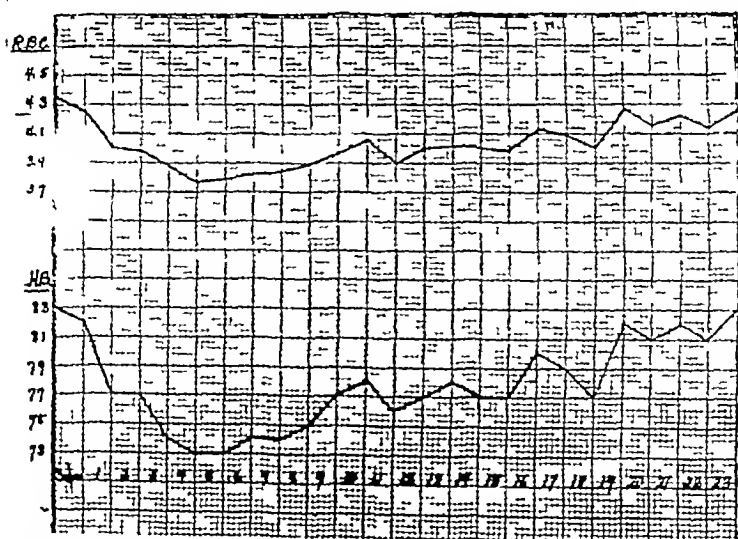


Figure 4 A composite graph of red blood counts in millions per cu mm and hemoglobin percentages of all patients taken at weekly intervals



FIGURE 5a

FIGURE 5b

FIGURE 5c

Fig 5a (Patient W.P.) X-ray of chest just before diasone therapy, showing left pneumothorax —Fig 5b (Patient W.P.) X-ray of chest 1 month, 9 days after beginning of diasone therapy, showing bilateral pneumothorax —Fig 5c (Patient W.P.) X-ray of chest 4½ months after beginning of diasone therapy, showing extensive bilateral hemithorax spread

seen in 12 of the 17 patients. This persisted throughout the administration of the drug, but disappeared after diasone therapy was discontinued.

Other toxic effects noted were

Nervousness	5 cases
Nausea	4 cases
Malaise	4 cases
Headache	3 cases
Tremor	2 cases
Vomiting	2 cases
Weakness	1 case
Diplopia	1 case
Blurred Vision	1 case
Dyspnea	1 case

These toxic effects seemed unrelated to the diasone blood levels.

We had no cases of dermatitis. Exfoliative dermatitis<sup>6,8</sup> and a fatal pemphigoid reaction to diasone<sup>10</sup> have been reported.

There had been no evidence of impaired hepatic or renal function. In one patient, a vaginal discharge (non-specific), cleared during diasone therapy.

One patient, W P, died while under diasone therapy. He was a 22 year old white male whose pulmonary tuberculosis was diagnosed Far Advanced III on admission. Because of severe pharyngeal and laryngeal involvement his prognosis was considered very bad, and active therapy was instituted. A left pneumothorax was begun (Fig 5-a), followed 2 months later by a right pneumothorax (Fig 5-b). Just before the institution of the right pneumothorax, a course of diasone was begun. Three months later it was felt that his condition was stationary, except for rather definite improvement in his pharyngeal involvement. One month later the patient had a miliary spread bilaterally (Fig 5-c). The patient died while receiving diasone therapy, after 5 months of treatment.

Post-mortem examination as made by Dr. John Saxton and Dr. Adrian Neerken was reported as follows:

The body is that of a 22 year old white man weighing an estimated 115 lbs and being an estimated 69 inches in length. The body is markedly undernourished but development appears normal.

**Peritoneal Cavity** Upon opening the peritoneal cavity the general disposition of the viscera is normal. The serosal surfaces are smooth and glistening.

**Pleural Cavity** There is a moderate degree of collapse of both lungs with an increased amount of free pleural space. The visceral pleura is thickened bilaterally.

*Pericardial Cavity* The pericardium is thin and the cavity contains an estimated 10 cc of straw-colored fluid

*Thyroid Parathyroids* Not remarkable

*Thymus* Not identified

*Larynx* The larynx is opened and shows an ulcerating lesion on both vocal folds and on the epiglottis. The borders of these ulcerations are slightly raised, are dirty and ragged

*Heart* The heart weighs an estimated 330 grams. It is of the usual shape and color. The endocardium is smooth and glistening. The myocardium is red-brown in color and appears in good condition. The foramen ovale is anatomically closed. The heart valves are thin and appear competent. The coronary vessels are patent throughout.

*Vessels* The aorta shows a smooth intimal surface. The vessels show a marked elasticity. The remainder of the blood vessels are not unusual.

*Lungs* The pleural surfaces have been described. Palpation reveals a nodularity throughout both lungs. The cut section shows several cavities in both apices, the largest being approximately 3 cm in diameter, and containing yellow-green foul pus. Throughout both lungs many small caseous lesions varying from 1 mm to 5 mm in diameter are seen. Many of these are clover leaf shape. They are firm and slightly raised and the centers are caseous. There is a marked dissemination throughout both lung fields. The tracheo-bronchial lymph nodes show many small caseous areas. The trachea and bronchi themselves show an injection of the submucosal vessels but otherwise are not grossly remarkable.

*Spleen* The spleen weighs an estimated 200 grams. The capsular surface is slate-gray in color. Upon cut section many gray follicles are present. The splenic parenchyma is soft and purple red in color.

*Alimentary Tract* The alimentary tract is examined from mid-esophagus to anus. No gross lesion is identified.

*Pancreas* The pancreas is of the usual size, shape, and consistency. Upon cut section the typical gray lobules are noted.

*Liver* The liver weighs an estimated 1200 grams. The capsular surface is smooth. Upon cut section the usual vascular markings stand out with slightly increased intensity, giving a nutmeg appearance to the cut surface.

*Biliary Tract* The gall bladder is of the usual pear shape and contains an estimated 15 cc of viscid, red-brown bile. The biliary tree is patent throughout.

*Adrenals* Not remarkable

*Kidneys* The kidneys weigh an estimated 150 grams each. The capsules strip without difficulty revealing a smooth cortical surface. On cut section the usual cortico-medullary ratio is present. An occasional small white caseous area is present in the region of the medulla. The mucosa of the renal pelvis is smooth.

*Ureters and Urinary Bladder* Not remarkable

*Reproductive Organs* The external genitalia have been described. The testicles are not unusual. Upon sectioning the prostate a small caseous area approximately 1 cm in diameter is present in one lateral lobe. Aside from this the prostate is not remarkable.

*Lymphatic System* Not remarkable

#### MICROSCOPIC FINDINGS

*Heart* No significant change is present in the section studied.

*Larynx* A section through the larynx shows an infiltration of the

submucosal portions with many mononuclear cells and lymphocytes. In several areas the epithelium is absent and there is evidence of caseation. A large cartilage is being eroded.

*Lung* The study of sections from various portions of the lungs shows a widespread dissemination of poorly formed caseous tubercles. There is little epithelioid proliferation noted, and Langhans giant cells are rare. Other apparently healed, fibrotic nodules are also seen. In several areas the alveoli contain edema fluid and polymorphs as seen in bronchopneumonia. No evidence of bronchial tuberculosis is seen.

*Liver* Throughout the liver a number of small fibrous nodules are present. These are surrounded by a lymphocytic infiltration in many areas, and are more proliferative than caseous in character.

*Kidneys* Sections of the kidneys show an occasional fibrous tubercle in the cortex. A rather large caseous area is present in the medulla of one kidney, surrounded by epithelioid cells and lymphocytes. Only an occasional Langhans giant cell is seen.

*Prostate* In the lateral lobe several large tubercles are noted. There were no changes in the histological sections of liver, spleen or kidneys which could be ascribed to diasone.

*Final Diagnosis* Lungs, Fibrocaseous Tuberculosis, Advanced with Cavitation, Bilateral, Tuberculosis of Larynx, Kidneys, Prostate, Liver, Bronchopneumonia.

### *Discussion*

In 1941 Hinshaw and Feldman<sup>1</sup> and Hinshaw, Feldman, and Moses,<sup>2</sup> reported very favorable results in the treatment of experimental tuberculosis in guinea-pigs with promin.

Later Callomon<sup>3</sup> confirmed this work, but found that diasone produced almost as favorable results, and was less toxic. Later Feldman, Hinshaw, and Moses<sup>4</sup> also studied the effect of diasone in experimental tuberculosis and corroborated these results. All of these studies were carefully done, and not only were there marked differences in mortality rate, but striking differences on pathological examination between the treated and untreated animals.

In 1944, Petter and Prenzlau<sup>5</sup> treated 44 patients having tuberculosis with diasone and found that 100 per cent of minimal and moderately advanced cases, and 78 per cent of far advanced cases showed some degree of improvement. Fifty-nine per cent of their cases showed sputum conversion and 43 per cent the closure of cavities.

Less encouraging results were reported by Benson and Goodman<sup>6</sup> who found only four cases out of 22 patients so treated whom they felt may possibly have benefited from the drug.

Recently Pfuetze and Pyle<sup>7</sup> reported treating 36 patients with diasone. They felt that 19 cases showed some improvement, and 17 were either unchanged or worse.

Five of our seventeen cases showed some improvement. None of these changes was remarkable or spectacular. In three of the



cases, other procedures may have played a part. In one case, although improvement has occurred in one area, in another area a cavity has increased in size. In the last case after initial improvement, the clinical course has remained stationary.

Corper and Cohn<sup>9</sup> feel that the mode of action of diasone in experimental tuberculosis may be largely through anoxemia. They also feel that since 1 gram of diasone per day has not caused evident anoxemia in man, that it is probable that therapeutic dosages have never been obtained. It is also highly probable, they say, that such therapeutic dosages would be dangerous.

The test which we imposed on diasone as a chemotherapeutic agent was a difficult one. The seventeen cases were mainly those in which ordinary therapy had failed. We did not try to determine whether diasone had any effect whatsoever on the course of human tuberculosis, but rather whether it has an effect significant enough to consider it a worthwhile clinical therapeutic adjunct.

Hinshaw and Feldman<sup>1</sup> caution against the "drawing of either positive or negative conclusions until the force of facts makes these conclusions self evident." To this we agree.

Dr. J. Arthur Myers, in discussing their paper, speculated upon the time "when a person who is found to react to tuberculin, but who has no evidence of tuberculosis will be treated by chemotherapy, just as the patient who has a positive Wasserman with no other evidence of syphilis is now treated by chemotherapy."

This time may come to pass. But we do not believe that the drug will be diasone.

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# Bronchiectasis· A Neglected Disease

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Within the past quarter century our knowledge of bronchiectasis has been enormously advanced. Iodized oil bronchography, introduced by Sicard and Forestier<sup>12</sup> in 1922, has been developed into a precise and easily applied method of diagnosis. Its wider use has shown that bronchiectasis is a very common disease, second only to tuberculosis as a chronic disease of the lungs in the opinion of many, even more common than tuberculosis in the estimation of others. Surgical treatment has been developed to the point that cure in properly selected cases is practically certain and operative mortality is strikingly low. Thus, a disease once considered uncommon, incurable and susceptible only to palliative medical treatment, is now known to be very common, is curable, and in some of its manifestations belongs just as surely in the realm of surgical disease as does acute appendicitis.

These events comprise one of the major advances in the field of medicine, an advance little noted except by physicians who are particularly interested in diseases of the chest, and even these have been hard put to it to keep abreast of the times, so rapid have been developments in the field of chest surgery.

During my years in private practice I saw little evidence that other members of the profession in the community where I practiced were aware of the commonness of bronchiectasis, and I myself would not have been impressed by its frequency had I not served on the staffs of two tuberculosis sanatoria where I saw many cases admitted with the mistaken diagnosis of tuberculosis.

As a naval medical officer it was most emphatically impressed on me that many cases are being taken into the armed forces because of the lack of awareness on the part of recruiting physicians of the symptoms of bronchiectasis or of its frequency. Other cases are developing after entrance into the service but go undiagnosed because of a lack of knowledge of how bronchiectasis develops or of the signs and symptoms that should make one think of it. Among the patients whom I have diagnosed as having the disease I have rarely found one who has so much as heard the word *bronchiectasis*. And when it is proposed that a part of a lung shall be removed he is completely overwhelmed by his fear of the consequences.

It is evident that a program of education concerning bronchiectasis is in order.

## MATERIAL

During the eighteen months that I was on the general chest service in a naval hospital, a diagnosis of bronchiectasis was made by means of iodized oil bronchograms in 59 cases. These patients comprised 6 per cent of the 9754 cases admitted to the hospital during that period, were the largest group of all the chronic non-tuberculous chest diseases treated on the service. Fifty-three of these patients were ultimately discharged from the Navy and comprised 4.8 per cent of the 1102 cases discharged during the same period.

Of these 59 patients only six had had a diagnosis of bronchiectasis previous to their admission to our service. In these six cases the disease was of many years standing and the symptoms "typical." In two other cases the diagnosis had been suggested but rejected because the patients were considered not to have the characteristic symptoms of bronchiectasis. As one medical officer put it, "This patient does not have the typical expectoration of large quantities of foul sputum."

Of particular interest to me was a group of 40 patients admitted to my ward at one time. They were part of a group of patients sent from a large naval training camp in the Northwest for further convalescence from complications or sequelae of streptococcus pneumonia, contracted during a severe epidemic of streptococcus infections that swept the camp. They were selected at random for admission to my ward and therefore were a fair sample of the entire group.

Of the 40 patients, 19 had only thickened pleura following empyema, one had chronic empyema, and 20 had residual pulmonary infiltrations which had persisted for approximately three months from the time of onset of the acute illness. Iodized oil bronchograms done on these latter 20 cases showed bronchiectasis in 12 of them. In the remaining eight cases the infiltrations ultimately disappeared.

Thus, of a group of cases with sequelae of streptococcus pneumonia, 30 per cent of the entire group were shown to have bronchiectasis and of the subgroup with persistent infiltrations in the lungs, so-called "unresolved pneumonia," 60 per cent were shown to have bronchiectasis.

## ANTECEDENT ILLNESSES

In the histories of the entire group of my patients, pneumonia was given as the antecedent illness in 29 cases, upper respiratory infection (rhinitis, sinusitis, pharyngitis, tonsillitis) in 15, asthma in 2, scarlet fever in 2, whooping cough in 2, measles in 1, lung abscess in 1 and inhalation of poison gas in 1. In six cases the

antecedent illness was unknown, the patients usually stating, "I have had a cough ever since I can remember"

It is probable that in most cases of bronchiectasis an area of pneumonia will be found at the inception of the disease if a chest roentgenogram is made. In going over the records of this series of cases it was found that in most instances, when the patient was seen in the dispensary before a chest roentgenogram was made, the diagnosis was of some type of upper respiratory infection, or acute catarrhal fever, but after admission to the hospital and the making of a roentgenogram the diagnosis was usually changed to bronchopneumonia, or atypical pneumonia.

There were a number of cases in the group following acute upper respiratory illnesses in which the symptoms of the antecedent illness were no more severe than those of a bad head cold. The history that so often is heard was given of a cold that "settled on the lungs." The only thing to suggest bronchiectasis was the persistence of cough and expectoration.

In only seven cases of this series was there evidence of purulent sinusitis during our observations of the patients. In five of the cases the purulent discharge was transient and in only two was it persistent enough to require prolonged treatment.

In recent years there has been a general trend away from regarding sinusitis as of etiological importance in the development of bronchiectasis. Most authorities now regard it as only coincidental. With this view I heartily agree.

#### AGE AT ONSET OF SYMPTOMS

The age at the onset of symptoms given by the patients is tabulated by decades in table 1. These figures agree with those of other observers which show that bronchiectasis has its onset in most instances during the first two decades of life. When it has its onset in later life some condition causing bronchial obstruction such as tumor, foreign body and asthma must be thought of in addition to the aforementioned causes.

TABLE 1 AGE OF ONSET BY DECADES

Decade	Number	Per cent
1 - 10 years	16	27.1
11 - 20 years	18	30.5
21 - 30 years	19	32.2
30 - 40 years	6	10.2
TOTAL	59	100.0

## DURATION OF SYMPTOMS

The length of time that the patients in this study had had symptoms is shown in table 2. It is of interest to note that 24 of our patients gave as the duration of their symptoms six months or less and an additional five, a year or less. Of the group of 24 cases, all had had streptococcus pneumonia in the large naval training camp previously mentioned. In all of these cases symptoms had been present approximately three months at the time we first saw them. However, it must be emphasized that their symptoms had been continuous ever since their attack of pneumonia. This is an important point. Most physicians think of its chronicity as being one of the most characteristic aspects of bronchiectasis. But most often bronchiectasis has its inception during an acute illness, usually bronchopneumonia, and it is therefore reasonable to conceive of it as having its acute, subacute, and chronic stages. Some authors have gone so far as to speak of "pre-bronchiectasis." To forget all but the chronic stage is to help bring about the situation described by Hinshaw and Schmidt,<sup>7</sup> who say, "Most of our patients who have bronchiectasis have had unquestionable symptoms for many years before a diagnosis was made. Often the disease has progressed to such an extent that it is incurable."

## SYMPTOMS

*Cough and expectoration* occurred in every case. In many instances the cough was not severe and the expectoration did not exceed one-half to an ounce of sputum raised in the period im-

TABLE 2 DURATION OF SYMPTOMS

<i>Time interval</i>	<i>Number</i>	<i>Per cent</i>
0 - 6 months	24	40.7
7 - 12 months	5	8.4
1 - 2 years	3	5.1
2 - 3 years	1	1.7
3 - 4 years	2	3.4
4 - 5 years	1	1.7
5 - 10 years	9	15.4
10 - 15 years	5	8.4
15 - 20 years	4	6.8
20 - 25 years	5	8.4
TOTAL	59	100.0

mediately after arising In some of the cases there was complete absence of cough or expectoration for variable periods *Foul sputum* occurred in but two cases and in these cases was only mildly foul Joress and Robins<sup>11</sup> found but two cases with foul sputum in a group of 32 cases of bronchiectasis diagnosed at an army hospital It is evident from these observations and from the findings of other clinicians that foul sputum is not of sufficient frequency to be considered of important diagnostic significance in bronchiectasis

*Increased susceptibility to respiratory infections* was complained of by the majority of the patients Bouts of acute illness characterized by malaise, fever of one to a few days duration, and increased cough and expectoration, were common In most instances such illnesses, prior to the patient's enlistment in the navy, had been diagnosed influenza, or occasionally, pneumonia

*Hemoptysis and pulmonary hemorrhage* were presenting complaints, or occurred during our observation of these patients, in 19 cases or 32 per cent Bronchiectasis is one of the most frequent, but at the same time the least frequently thought of, cause of pulmonary bleeding

*Dyspnea with exertion* was complained of by six patients These included the two cases who had suffered from asthma prior to their developing symptoms of bronchiectasis, one other case that developed asthma subsequent to the onset of his symptoms of bronchiectasis, and three cases with disease of many years standing In all cases of bronchiectasis of long standing there is significant pulmonary fibrosis and emphysema In certain instances, these changes, in addition to pulmonary arteriosclerosis which accompanies them, ultimately lead to right heart failure

*Lack of energy, weakness, and lassitude* were complaints in a few cases but there was no detectable correlation between these symptoms and the extent of the bronchiectasis in any given cases

### PHYSICAL FINDINGS

*Medium moist rales in the lungs*, due to the pneumonitis that commonly accompanies bronchiectasis, were heard in all of these cases except three In many cases *coarse bronchial rhonchi* were also heard In those cases with areas of atelectasis or pneumonitis significantly large, *dullness and changes in the breath sounds* over the involved area were detected

*Clubbing of the fingers* was found in but one of our cases In a series of 32 cases found by Joress and Robins<sup>8</sup> in an Army station hospital, this finding was present in but one case This low incidence of clubbed fingers is in marked contrast to that reported by Findlay and Graham<sup>4</sup> who found it in 50 per cent of their cases,

by Ogilvie<sup>10</sup> who found it in 39 per cent, or Fletcher<sup>5</sup> who found it in 35 per cent

Lisa and Rosenblatt<sup>9</sup> state, "The clubbing of digits is an important sign in bronchiectasis and occurs in a significant percentage of cases There is no direct relationship between the extent or duration of bronchiectasis and the incidence of clubbing "

With the latter statement I cannot agree The writers who report a high incidence of clubbing of the fingers are probably reporting on cases of long standing In my opinion when clubbed digits are present, there are always other signs that make the diagnosis fairly obvious

### RADIOGRAPHIC FINDINGS

The types of x-ray shadows found on the standard film made at the time of admission of these patients to our service, is summarized in table 3 *Thickening and fuzziness of the linear shadows* in the lower lung field, was in this series, as in most others, the most frequently encountered radiographic abnormality

A common error in interpretation of this type of shadow is to consider the normal vascular shadows which are heaviest in the bases along the heart borders—precisely the same locations where abnormal peribronchial infiltration is usually found—as being abnormally thickened linear markings If there is any movement at all during the making of the chest roentgenogram, these shadows are certain to be fuzzy, which increases the illusion that they are abnormal Therefore, all films of the chest, in order to be of proper technical quality, must be made with a short enough exposure time that all movement is "frozen"

*Atelectasis* may be associated with bronchiectasis, and was evident in the chest roentgenogram in nearly half of our cases It is often not apparent on superficial examination The commonest site for bronchiectasis is in the posterior divisions of the lower lobe bronchus, behind the heart If atelectasis occurs in such an area the increased density of the lung tissue is hidden by the heart or diaphragm, and manifests itself by a shift of the former to the left and an elevation of the latter These changes in position are often not great and must be carefully looked for Serial films, by showing a shift of the heart to the midline or of the diaphragm downward, may provide the only clue that atelectasis was previously present In only one of our cases was seen the triangular basal shadow in the cardio-phrenic angle, characteristic of lower lobar atelectasis

*Pneumonic shadows* were seen in the roentgenogram of approximately one-third of our cases In all but two instances these were

of patchy, flocculent appearing type, and were usually interpreted by the roentgenologist as representing bronchopneumonia or, less commonly, atypical pneumonia

*Ring shadows*, which Andrus<sup>2</sup> saw in a large percentage of his cases and which he ascribed to localized emphysema, were seen in 21 per cent of this series. In my opinion, the significance of this type of shadow is not easy to determine and I do not consider them of much importance in helping to make a diagnosis of bronchiectasis. They are invariably accompanied by shadows of more significance.

It must be emphasized that bronchiectasis *per se* causes no abnormal x-ray shadows. The latter are due to the accompanying pneumonitis, atelectasis, and fibrosis. In a significant number of cases, 18 per cent of this series, a *negative roentgenogram* was reported. Bronchograms are always necessary for positive diagnosis.

### TECHNIQUE OF IODIZED OIL BRONCHOGRAPHY

Many techniques for the introduction of iodized oil into the bronchi have been described, but for general use there is but one practical method—the supraglottic technique. It is simple, requires no special apparatus and causes a minimum of discomfort to the patient.

The success of the method depends largely upon the use of adequate sedation and topical anesthesia prior to instillation of the oil. I use 15 mg ( $\frac{1}{4}$ gr) of morphine and 0.45 mg ( $\frac{1}{150}$  gr) of atropine hypodermically one hour before the examination is made. Immediately before instilling the oil the pharynx is thoroughly sprayed with a 2 per cent solution of pontocaine. The atomizer tip is then directed downward and, as the patient inhales, the spray is directed into the larynx and trachea. For most cases this amount of anesthesia is sufficient. For some patients, whose cough reflex is particularly sensitive, a cc or two of pontocaine solution may be dripped into the larynx through the same cannula that is later used for the iodized oil.

The iodized oil, which has previously been warmed to body tem-

TABLE 3 TYPES OF X-RAY SHADOWS

Type of shadow	Number	Per cent
Thickening and fuzziness of the linear markings	46	78
Evidence of atelectasis	28	48
"Ring shadows"	12	21
Pneumonic shadows	19	30
No abnormal shadows	11	18



perature in a warm water bath, is introduced into the pharynx through a long cannula attached to a 10 cc syringe. During this procedure the patient grasps the tip of his tongue with a piece of gauze and pulls it firmly forward. I feel that concentrating his attention upon this simple act, rather than on the manipulations of the operator in his throat, prevents the patient from gagging. It makes no difference into what part of the pharynx the oil is introduced, it will flow into the larynx and thence into the trachea unless the patient coughs, gags, or swallows.

The oil is directed into the bronchi which the operator desires to visualize, by proper positioning of the patient. For routine work the patient is placed in four positions: (1) with his thorax inclined forward and to the right, (2) backward and to the right, (3) forward and to the left, (4) backward and to the left. These positions permit visualization of the bronchi of both lower lobes, the right middle lobe and the lingula of the left upper lobe. It is only in exceptional cases that visualization of the right upper lobe and of the left upper lobe, with the exception of the lingula, is required. If this is necessary, I have found that it is easily accomplished by instilling iodized oil into the lower lobe of the homolateral lung and then placing the patient upon an inclined plane with the upper lobe which is desired to be visualized in the most dependent position. The most satisfactory inclined plane is of course a fluoroscopic tilt table. The flow of oil from the lower lobe into the upper lobe bronchi can then be watched and when it is satisfactory, roentgenograms made.

Routinely in bronchography, the roentgenograms that are made comprise postero-anterior, and lateral views. It is also desirable to have oblique views. These "spread out" the shadows of the lower lobes and facilitate their study. For my part, if the number of films that can be made is limited, I prefer a stereoscopic pair of postero-anterior films.

*Interpretation of the results of bronchography.* If satisfactory filling of the bronchi to be visualized is obtained, the presence or absence of bronchiectasis is usually obvious. Dilatation of the diseased bronchi is usually sufficient so that it cannot be overlooked. Since the diseased bronchi have lost their ability to eliminate foreign material, the opaque oil fills them more solidly than it does the normal bronchi, which begin to eliminate the oil immediately and soon contain but a coating of it on their walls. Furthermore, the oil readily penetrates the alveoli connected with normal bronchi but not those connected with ectatic bronchi. The result is what has been labelled a "leafless tree" appearance. The diseased bronchi appear as the broken stump of dead limbs on a dying tree.

However, there are cases in which the bronchial changes are so inconspicuous that it is difficult to determine whether they represent normal variations in calibre or beginning bronchiectasis. It must be remembered that the diminution of the calibre of bronchi, as one passes from the larger to the smaller divisions, is very uniform and if one finds any "beading" or localized bulging along the course of a bronchus it is entirely likely that it represents early bronchiectasis.

*The location of the lesions* in this series, as shown by bronchography, is summarized in table 4. In this, as in most reported series, the commonest location for bronchiectasis is the left lower lobe, and here, the bronchi in the posterior portion behind the heart are those most often involved. In this area advanced bronchiectasis may be present without there being any evidence of it on a standard roentgenogram of the chest.

It must be noted that in 41 cases (70 per cent) of this series the disease was unilateral and that in most of these (40 cases) it was confined to one lobe. This finding is in marked contrast to that reported by Churchill<sup>3</sup> that in 80 per cent of the cases operated on by him in which the left lower lobe was removed, the lingula of the left upper lobe was found to be involved also, and to the statement by Alexander<sup>1</sup> that, "The lesions are more often bilateral than unilateral." Probably the explanation of this discrepancy is that 49 per cent of our series of cases were diagnosed when symptoms had been present for less than a year. The involvement of the bronchi corresponded to the original area of pneumonia.

TABLE 4 LOCALIZATION OF LESIONS

<i>Area of Involvement</i>	<i>Number</i>	<i>Per cent</i>
Left lower lobe alone	23	39
Right lower lobe alone	13	22
Both lower lobes	12	20.3
Right middle lobe alone	2	3.4
Both lower lobes and right middle lobe	2	3.4
Both lower lobes, right middle lobe and lingula of left upper lobe	2	3.4
Right upper lobe alone	1	1.7
Lingula left upper lobe alone	1	1.7
Right middle and right lower lobes	1	1.7
Left lower and right middle lobes	1	1.7
Both lower lobes and lingula of left upper lobe	1	1.7
TOTAL	59	100.0

Though there is a widespread impression that bronchiectasis is a progressive disease, there is no unanimity on this point Lisa and Rosenblatt<sup>9</sup> feel that the maximum damage is usually done at the time of onset of the disease and there is little tendency for it to increase in severity or extent Churchill<sup>3</sup> says, "We have to admit that bronchiectasis, under observation, progresses slowly if at all"

It must be admitted that there is no close correlation in any individual case between the length of time symptoms have been present and the extent and severity of the bronchiectasis A patient may have had his disease for 25 years and still have unilobar bronchiectasis or may have had it for a short time and show multilobar involvement Nevertheless, it was a very conspicuous fact that, in this series, those who had the least bronchiectasis practically all fell in the group of 24 cases who had had streptococcus pneumonia in the large training camp three months previous to admission to our service To me it is inconceivable that an active infection in the lung, rendered incurable by irreversible tissue changes, should remain over a period of years, confined strictly to the area of original involvement The frequency of flare-ups of acute pneumonitis testifies that the adjacent lung tissue is not capable of developing any effective immunity

For my part, I shall consider as a safe working principle that the earlier bronchiectasis is diagnosed, the less the involvement that will be found, and therefore the greater the certainty that the patient can be cured

### COMPLICATIONS OF BRONCHIECTASIS

The occurrence of episodes of *acute pneumonitis* is so constant in patients with bronchiectasis that it can logically be considered a part of the disease syndrome Sometimes the parenchymal involvement becomes so extensive as to result in lobar consolidation Such an episode is not infrequently the final one in a patients' illness *Pulmonary abscesses*, usually of small size are probably present in all cases of bronchiectasis Those of such size as to be diagnosable roentgenographically are not so frequent Extension of the pulmonary suppuration to the pleural space resulting in *empyema* is not uncommon If the disease is of long enough standing *pulmonary fibrosis* and *emphysema* are inevitable These changes may become so severe as to lead to *cor pulmonale* *Amyloidosis* is always listed among the complications of bronchiectasis but it must be relatively rare I have never seen a case and Perry and King<sup>11</sup> report but one case in a series of 400 *Metastatic abscesses*, usually in the brain but also in the liver and bones, are not uncommon

Among our cases, three developed pneumonitis of such severity

and extent as to present physical and x-ray findings indistinguishable from lobar pneumonia. Eight additional cases had acute episodes of pneumonitis of milder degree. All of them recovered from the acute illness promptly. The temperature was usually normal by the end of the second or third day. However, rales in the lungs were persistent, and cough and expectoration were usually worse than before the acute illness. This chain of events, prompt recovery from an acute illness resembling pneumonia, but with persistence of rales, cough and expectoration is almost diagnostic of bronchiectasis, and it should lead to the making of bronchograms in every case.

One of our patients, with advanced bronchiectasis of the left lower lobe simultaneously developed osteomyelitis of the right 6th and 7th ribs and multiple frontal lobe cerebral abscesses. His death was the only one of this series.

### TREATMENT

*Prophylaxis* The essence of the prophylactic treatment of bronchiectasis is the constant awareness on the part of the attending physician of the possibility of the development of bronchiectasis in any child or young adult suffering from an acute respiratory infection. If purulent secretion develops during such illness, complete drainage of the bronchial tree must be insured. Medically this is done by altering the bronchial secretions and by the encouragement of gravity drainage of the bronchi.

Various methods are used to modify the sputum. Of the expectorants that are commonly used I have found potassium iodide to be the only one of any use. Steam inhalations may have some effect during the acute stage of bronchitis. Inhalations of carbon dioxide are said to thin bronchial secretions and by hyperventilating the respiratory tract tend to dislodge tenacious mucus. It is most useful in the presence of atelectasis.

Bronchiectasis occurs, with rare exceptions, in the most dependent bronchi. It is therefore obvious that one of the ways to discourage its development is to place the patient with an acute respiratory illness in a position such that these bronchi are no longer the most dependent. This is done very simply by having him lie in a prone position. The inclination of the trachea is dorsally, and with the patient in a prone position sputum is able to travel downhill all the way from the posterior bronchi in the bases of the lungs to the pharynx. The average patient, if left to his own devices, lies in bed on his back, usually propped up on pillows. In this position, gravity drainage of the posterior lower lobe bronchi is the most severely hampered.

In addition to instructing patients to maintain a prone position

as much as possible, I have made it a practice for years to use postural drainage, as it is used in cases of bronchiectasis, on all patients with purulent bronchial secretion, unless severe illness of the patient or cardiovascular conditions contraindicate it

If, with the preceding regime, cough and expectoration do not promptly subside, bronchoscopic aspiration is indicated. In all cases in which cough, expectoration, rales in the bases of the lungs, and radiographic evidence of pulmonary infiltration or atelectasis persist for more than a few weeks after a respiratory infection, bronchograms should be made

The modern chemotherapeutic agents deserve mention as factors in the prophylaxis of bronchiectasis. Inasmuch as streptococci are the chief offenders in this disease, the sulfonamides and penicillin should prove effective in many cases of respiratory infection in breaking the chain of events that leads to bronchiectasis before it has been completed. Nevertheless, it was strikingly apparent in this series that chemotherapy, particularly with the sulfonamides, does not provide certain insurance against the development of bronchiectasis, for many cases developed following sulfonamide therapy for the primary pneumonia. It is too early to evaluate penicillin in this regard.

*Medical Treatment* In established bronchiectasis, medical treatment is palliative only. In none but the very earliest cases can cure by medical means be hoped for. Postural drainage is the only one of these measures that is of positive value and its value is distinctly limited. To get the greatest benefit from it, the patient's chest must be inverted and maintained in as nearly vertical a position as possible for as long as the patient can tolerate this position. This means that he must lie on the edge of something at least as high as the ordinary hospital bed, supported by his thighs on the bed or table and his hands on the floor. This position should be demonstrated to him to be sure that he understands it and he should be instructed to maintain it as long as possible, even though secretion is not immediately forthcoming. It is only from large saccular dilatations that the secretion will pour forth as from an inverted cup. With the chest inverted the difficulty in draining secretion from slightly or moderately dilated bronchi is the same as that encountered in draining liquid, especially if it is highly viscous, from any cylindrical tube closed at its upper end. Voluntary coughing, not too violently, is of considerable aid in dislodging the secretion. This drainage should be done at frequent intervals if maximum benefit is to be obtained. A good schedule is to do it upon arising, before each meal, and upon retiring. Postural drainage is, of course, contraindicated in debilitated patients and in those with hypertension or evidence of

arteriosclerosis The increased hydrostatic pressure in the vessels of the head might easily cause retinal or cerebral hemorrhage in the presence of diseased arteries

*Surgical treatment* The establishment of lobectomy as the treatment of choice in bronchiectasis within the period of a little more than a decade is one of the more important recent developments in medicine In their monumental volume "*Surgical Diseases of the Chest*" published in 1935, Graham, Singer, and Ballon<sup>6</sup> remark concerning this procedure, " the operation remains even in the best hands one of the most serious procedures in the surgical repertory a patient with bronchiectasis who submits to a lobectomy runs about a 15 to 20 per cent risk of dying because of the operation and if he recovers from the operation he has only about a 65 per cent chance of having a thoroughly satisfactory result with solid healing of the wound "

This situation is entirely changed In the best of hands, the mortality for lobectomy is now 4 per cent or less With more precise bronchography a thoracic surgeon may now operate with more assurance that he is going to remove all of the diseased lobes, thus attain a higher percentage of complete cures Refinements in surgical technique and the use of the sulfonamides and penicillin prophylactically against post-operative infections have reduced to an almost negligible figure the percentage of permanent bronchial fistulae and failures of wound healing A physician who nowadays fails to refer a case of bronchiectasis suitable for lobectomy to a chest surgeon is almost as derelict in his duty as one who treats acute appendicitis with ice packs As Churchill<sup>3</sup> has put it, " the time has arrived when the medical profession can stop fumbling with bronchiectasis "

Nevertheless, it was possible to do lobectomies in but 7 cases of this series, in spite of the high percentage of cases suitable for the operation The biggest obstacle in our path was the refusal of patients to submit to the operation

### SUMMARY

1 Bronchiectasis is a common disease Among 9754 cases admitted to a large naval hospital 59 cases were found, an incidence of 0.6 per cent This incidence is comparable to that of pulmonary tuberculosis as determined by mass surveys

2 In only six patients of this series had a diagnosis of bronchiectasis been made prior to their admission to the naval hospital from which final disposition was made

3 Most cases of bronchiectasis follow streptococcal respiratory infection of one type or another, the most common being broncho-

pneumonia Sinusitis was not found commonly to precede or accompany bronchiectasis

4 The expectoration of large quantities of foul sputum and clubbing of the fingers were found to be distinctly uncommon in this series Foul sputum was found in but two cases and clubbing of the fingers in but one

5 Persistent cough and expectoration following a respiratory illness occurred in every case in this series The persistence of this combination of symptoms following an acute respiratory illness should always make the physician think of bronchiectasis

6 The commonest radiographic findings were thickening and fuzziness of the lung markings at the bases of the lungs When these findings occur together with persistent cough and expectoration, bronchiectasis is found on making bronchograms, in a high percentage of cases

7 Bronchograms made with iodized oil are the only sure means of diagnosing bronchiectasis They are simply and easily made by means of the supraglottic method of instilling iodized oil into the tracheobronchial tree

8 Lobectomy is as surely established as the treatment for certain types of bronchiectasis as is appendectomy for the treatment of acute appendicitis, but its usefulness has been sharply limited by the lateness with which most cases of bronchiectasis are diagnosed

I wish to express my sincere appreciation to Dr John C Jones of Los Angeles for performing the lobectomies done in this series

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## RESUMEN

1 La bronquiectasia es una enfermedad comun Entre 9754 casos admitidos a un espacioso hospital naval se descubrieron 59 casos, o sea una frecuencia del 0.6 por ciento Esta frecuencia es comparable con la de la tuberculosis pulmonar determinada por censos colectivos

2 Solamente en seis pacientes de esta serie se habia hecho un diagnóstico de bronquiectasia con anterioridad a su ingreso al hospital naval donde se llevó a cabo la disposición final del caso

3 La mayor parte de los casos de bronquiectasia siguen a infecciones de las vías respiratorias por estreptococos, de un tipo u otro, el más comun de los cuales es la bronconeumonía No se encontró que la senositis precediera o acompañara comunmente a la bronquiectasia

4 La expectoración de grandes cantidades de esputo fétido y el ensanchamiento de la punta de los dedos fueron hallazgos muy raros en esta serie Solamente se encontró esputo fétido en dos casos y ensanchamiento de la punta de los dedos en uno sólo

5 La tos y la expectoración persistentes consecutivas a una afectación de las vías respiratorias se presentó en todos los casos de esta serie. La persistencia de esta combinación de síntomas como consecuencia de una enfermedad aguda de las vías respiratorias, siempre debe hacer pensar al médico en la bronquiectasia.

6 Los hallazgos radiográficos más comunes fueron engrosamiento y obscurecimiento de las marcas pulmonares en las bases de los pulmones. Cuando estos hallazgos van acompañados de tos y expectoración persistentes, los broncogramas revelan bronquiectasia en un alto porcentaje de casos.

7 Los broncogramas con aceite yodado son el único método certero de diagnosticar la bronquiectasia. Se llevan a cabo estos broncogramas con sencillez y facilidad mediante el método supra-glótico de introducir el aceite yodado en el árbol tráqueobronquial.

8 La lobectomía está tan firmemente establecida como tratamiento para ciertos tipos de bronquiectasia como lo está la apendectomía en el tratamiento de la apendicitis aguda, pero su utilidad ha sido sumamente limitada por lo tarde que se diagnostican la mayor parte de los casos de bronquiectasia.

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# Proposed State Tuberculosis Control Program\*

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With the appearance of favorable federal legislation and grants-in-aid, tuberculosis control activities are being stimulated throughout the entire nation. Educational campaigns and surveys carried on through many years in the past have made the public tuberculosis conscious. In order to take full advantage of these favorable conditions, it now becomes necessary to make an inventory of present and past State control procedures and to make such changes and additions as will insure a successful long-term program.

Any control program, if it is to fulfill its mission, must embody the basic principles of disease control—case-finding, case-isolation, and case-prevention. Since at this writing, no immunizing method has been proved to be of long-time value, the prevention of secondary cases depends upon finding the source cases early and treating them before they become infectious. Current treatment implies initial hospitalization in a sanatorium.

Tuberculosis is a chronic disease and there are no specific cures as yet. Under certain conditions, such as defined in the Diagnostic Standards and Classification of Tuberculosis, patients may be classified as apparently arrested, arrested, and even apparently cured. No cases are classified as cured. Obviously then, the occupation, and the home and working conditions of a person with inactive disease must be evaluated and altered, if necessary, to prevent the reactivation of the disease. Thus, home welfare and vocational rehabilitation, where required, along with case-finding, case-isolation, and physical restoration must be provided if we are to improve our methods in the control of tuberculosis.

It therefore follows that an adequate tuberculosis control program should embody the following four basic functions:

- (1) Case-finding,
- (2) Isolation (hospitalization and treatment),
- (3) Rehabilitation and family welfare, and
- (4) Prevention

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### *Case-Finding*

Experience has shown us that tuberculosis develops in the lungs long before any physical signs or symptoms appear. The vast majority of patients are not aware of their condition until symptoms develop or until a chance examination of their chest reveals the disease. In many instances, the disease develops and becomes arrested without the patient being aware of any disease at any time.

It naturally followed that case-finding programs became founded and developed on tuberculin tests and chest x-rays. The time and money factors involved in such programs were obstacles to expected accomplishments on a State-wide basis. We still find over 85 per cent of the patients admitted to the sanatoria in the advanced stage of the disease.

For many years, the Minnesota Department of Health has been concerned with the large number of cases which were first reported at the time of or just prior to death. In 1945, 15 per cent of the deaths from tuberculosis were first reported at the time of death. Even though this percentage is a marked decrease from 45 per cent in 1923, the percentage is still too large. Mortality statistics for the United States reveal that in 1944 thirty-six (36) per cent of the tuberculosis deaths occurred outside of institutions and hospitals. Only 36.6 per cent of the tuberculosis deaths for that year occurred in tuberculosis hospitals or nervous and mental institutions. These figures represent only a slight betterment over the 1939-1941 averages. The implications of serious intimate exposure to contacts by these open cases is evident.

Obviously, newer methods were necessary for mass examinations.

As a result of the work of deAbreu, Potter, Hilleboe, and others, it is now possible for us to employ mobile photofluorographic units capable of taking large numbers of chest films daily. With the use of such equipment mass radiography or photofluorography can be done at lower costs and with economy of personnel and time. It is to be expected that further experiences in the field will bring further improvements in our mass attack on tuberculosis. The use of the mobile x-ray unit for mass chest surveys should not cause the elimination of other satisfactory case-finding procedures.

The ideal case-finding method would be not only to tuberculin test all persons in the community with either 1:1000 dilution (0.1 mg) of O.T. or the two test dose of P.P.D., but also to chest x-ray all the persons regardless of the tuberculin reaction every year.

Obviously, a program of this type would not be practical. A very

effective case-finding program can be carried out by applying these procedures on a need basis. Each area should plan its own program according to the local situation.

An effective case-finding program, then, should embrace these three activities:

- (1) Mass photofluorography (to include chest x-ray examinations of hospital employees and patients),
- (2) Tuberculin surveys, and
- (3) Case-contact follow-up

### *Mass Photofluorography*

The details for the operation of the State owned units are recommended as follows:

#### 1 *Personnel*

##### A Fixed, on State payroll

- (1) Technician-driver, responsible for the operation and the maintenance of the unit in the field
- (2) Clerk-typist, responsible for the necessary unit clerical work, including completion of the required unit forms
- (3) Public Health Nurse, with special organizational ability, responsible for the advance organization and stimulation of the survey project, also responsible for public relations. She will act as "advance agent" for the unit and enter the community well in advance of the unit. It is not intended that the nurse remain with the unit during the entire period of the survey but will move on to the next project area as soon as practicable. It is understandable that in surveys of industries, schools, and other selected groups it will not be necessary for the nurse to remain any length of time, and that in other areas it may be necessary for her to remain a longer period of time.

##### B Attached personnel, local

It will be necessary to obtain from local sanatoria, and local voluntary and official public health and welfare agencies such additional personnel as will be required to fill out an efficient organization. These workers may either be paid or voluntary, but if paid, they will have to be paid from local resources. The amount and type of assistance required and obtained will vary in different communities.

#### 2 *Planning the project*

##### A Selection of the area for mass survey

It is expected that the appearance of the mobile unit in the field will stimulate a great deal of interest by lay and medical groups for the use of the unit in their area. The function of the unit is to find tuberculosis cases. In view of the fact that certain population groups have a greater tuberculosis potential than others, the selection of areas for mass survey must be carefully considered. It is not necessary to make a survey area county-wide, but the population group chosen should be accessible and large enough to

make the project practicable. In some areas the project may be solely industrial.

Requests from all lay or professional groups will be accepted. All requests for surveys will be submitted to the State Department of Health. These requests will then be screened by the Tuberculosis Control Officer, State Department of Health, and the Chief, Medical Services Unit, Division of Social Welfare. Final selection of the area to be surveyed will be determined by the Tuberculosis Control Officer, State Department of Health, Chief, Medical Services Unit, and Director of local sanatorium or State Sanatorium concerned. The component medical society will be consulted prior to placing the survey area on the calendar. Priorities will be determined from study of the tuberculosis problem, local cooperation and public interest, available local personnel for follow-up, and such other local conditions as may influence the success or failure of the project.

It therefore follows that areas or population groups chosen for mass survey should be selected on the basis of need. These are the indices which may be used to determine the need of such surveys:

- (1) Number of deaths from tuberculosis and its rate
- (2) Ratio of number of new cases discovered to number of annual deaths
- (3) Number of cases reported at time of death or shortly before death
- (4) Number of sanatorium cases

A study of these indices will give us a measure of the tuberculosis problem in various areas. However, it is to be recognized that in analyzing deaths and death rates, conclusions are apt to be faulty because of a number of variables which are difficult to control.

Since certain population groups have a greater tuberculosis potential than others, it is advisable that initially the following groups be used as focal points for mass surveys:

- (1) Known and suspected cases and their contacts
- (2) Employees in industries. Mass surveys in this group are best by separate industry.
- (3) Employees of institutions and hospitals
- (4) Persons residing in low economic areas
- (5) Students in colleges and senior high schools

#### B Preparation for survey

When the area or group for a mass survey has been selected, sufficient time should be allowed for preparation. The amount of time necessary will vary in different localities. Generally speaking, at least two months will be required in most places. However, it is understandable that in industries or in selected group surveys a great deal less time may be all that is necessary.

It is desirable that the local, district, or State Health Department sponsor the case-finding program. Every effort should be made to have the local or State Sanatorium participate actively in the program. The amount of sanatorium collaboration will depend upon the proximity of the sanatorium to the survey area and upon the active interest shown by the sanatorium director. The voluntary

Public Health Association (Christmas Seal Organization) and its local organizations should be invited to participate actively in the project. In counties not affiliated with the National Tuberculosis Association, the invitation should be rendered to the local independent association. Other official and voluntary health and welfare agencies should also be asked to participate.

The following procedure is recommended:

- (1) Selection of the area to be surveyed in accordance with instructions in 2-A above. Consideration should be given all requests received by the State Department of Health, but need should govern selection of the area.
- (2) Tuberculosis Control Officer should visit area selected and confer with Director of local sanatorium or State Sanatorium and determine with him degree of sanatorium collaboration. Conferences should then be held with the appropriate committee of the component medical society and then with the official and voluntary health and welfare agents and agencies. A general advisory committee will then be formed. The committee should consist of representatives of the medical profession, religious, fraternal and farm groups, management and labor, and civil and educational leaders. The exact make-up of the committee will vary in different communities in accordance with local conditions.
- (3) Well in advance of the date of the survey the public health nurse of the mobile unit to be sent to the area should enter the community and with a working sub-committee of the general advisory committee, organize the campaign. The organization should include the formation of groups of voluntary workers, each group of which should be given definite duties. The planning should include the following:
  - (a) Intensive educational campaign consisting of speakers, posters, radio and newspaper notices, pamphlets, films, etc. The educational campaign should be under the supervision of the Educational Service Unit, State Department of Health, in collaboration with the voluntary Public Health Association.
  - (b) Arrangements for the inclusion of local industries and schools in the survey.
  - (c) Procedure for visiting homes in which there are cases and contacts.
  - (d) Arrangements for an intensive drive to get in as many of the general public as possible, emphasis placed on barbers, beauty operators, food handlers, bartenders, and hotel and laundry employees.

The entire preparatory planning and work should be so arranged that the unit will arrive at the peak of the stimulation so that it can be kept busy during the period of its stay there.

- (4) Before the program is started in a community, arrangements must be made with the appropriate authorities for hospitalization of cases found and in need of treatment.
- C Role to be played by county sanatoria. This should be integrated with the Tuberculosis Committee of the State Medical Society.

### 3 Operation of units

#### A. Miniature film, reading of film

All examinees except cases should report to the unit in accordance with their appointment time. They will each report to the unit clerk and receive from her an identification card (mass radiography form No 1), which they will complete if not previously filled out, and then give this form to the technician as they report to him for their x-ray.

Each evening, project films exposed during the day should be processed in the unit and then promptly sent to the place where the films are to be reviewed by the central office. In some localities, it may be necessary for the roentgenologist of the State Department of Health to visit the unit and read the films while there. The report of the project films should be sent without delay to the unit clerk. If the report returned is essentially negative, then the clerk will give the properly filled out tabs from mass radiography form No 1 to the physician designated by the patient. The examinees will be notified to report to their physicians for the findings. If a retake on 14" x 17" celluloid film is indicated, the examinee will be notified by the unit clerk that a re-examination is necessary because the project film was found to be unsatisfactory.

#### B 14" x 17' celluloid films

Prior to the entrance of the mobile unit in the area, it should be determined by conference with the component medical society as to whether the x-ray examinations of cases and suspects and re-takes of project film on 14" x 17' celluloid films should be done by the mobile unit or through local facilities. The unit is prepared to take 14" x 17' roentgenograms if such are desirable. The procedure should be followed whether the abnormal project film findings reveal suspected tuberculous or non-tuberculous lesions.

If the 14" x 17" films are taken by the mobile unit, they should be processed either at the nearest local hospital or sanatorium or sent unprocessed to the central office where they are processed, if necessary, and interpreted by the state roentgenologist. If the 14" x 17" films are taken by the local physician, clinic or hospital, then the local physicians should be urged to submit these films to the central office for interpretation.

All findings should be sent to the designated private physician or clinic or hospital and copies submitted to the Director of the local sanatorium (or State Sanatorium), and the District Health Unit or County Public Health Nurse.

### 4 Follow-up

Following the operation of the mobile unit in the area it is necessary that immediate follow-up be made of the cases found through the survey, and of the cases and suspects and their contacts who have not reported for their examinations. The follow-up is an essential part of the program and should be done without delay in order to determine those who are in need of active treatment or observation. Appropriate disposition should be made of all cases or suspects as early as possible.

### *Tuberculin surveys*

Tuberculin surveys when properly conducted are necessary for a well-balanced control program. Their use is recommended as follows

- (1) to determine the rate of infection in a community,
- (2) for epidemiological investigation,
- (3) for case-finding in a low tuberculosis area

If a tuberculin testing program is planned, those groups and ages should be tested which will accomplish the purpose intended. In all events, positive reactors should be used as a lead in tracing cases back to the homes, shops, and/or schools. If this is not done, then the real value of such programs is reduced.

If a large enough proportion of the general public is x-rayed at accepted intervals, most of the infectious active cases of tuberculosis will be discovered and removed from the community. Since, at the present time, there are an insufficient number of mobile units and personnel to operate these units, tuberculin surveys can be effectively employed in the interim. It is hoped that analysis of the x-ray surveys now being conducted will determine the optimum time for re-ray of a community.

### *Contact follow-up*

It has been established that the chances of developing reinfection tuberculosis is directly proportional to the degree and amount of exposure to an infectious case. For that reason, intimate contacts of active cases will require closer medical supervision than casual contacts or positive reactors from unknown sources. It has also been established that the vast majority of contacts over twelve years of age who subsequently develop tuberculosis do so within three years after exposure.

It therefore follows that all contacts should be closely supervised during the exposure period and for three years after the exposure has been interrupted. The interval for re-examination should be determined by the attending physician. However, after the three-year period, annual chest x-ray should suffice. Here again, the attending physician, because of previous findings or knowledge of the patient's home conditions, may desire to continue the contact on closer medical supervision.

In addition, mass x-ray and tuberculin surveys will uncover a significant number of cases which will have to be studied clinically for diagnosis and activity.

*The importance of the private physician should not be overlooked.* He is the one who can find a large number of cases in the important population group not entirely reached by other procedures. He should be encouraged to employ a more aggressive anti-

tuberculosis action In addition, he is consulted by the confirmed case as to treatment, etc

At the last State Medical Association Annual Meeting, the Council and House of Delegates of the Minnesota State Medical Association approved the report by their Committee on Tuberculosis in which was included the recommendation that medical and sanatorium care should be arranged for any active case of tuberculosis

### *Isolation (Hospitalization and Treatment)*

Isolation is an important procedure in our control program The earlier a case is isolated the less probability the contacts will develop tuberculosis At present over 85 per cent of sanatorium admissions have advanced disease on admission This alone would indicate that a large number of persons are being needlessly exposed to tubercle bacilli in their homes, shops, schools, etc

Minnesota has 14 county sanatoria serving 44 counties and one State Sanatorium serving the remaining 43 counties The combined bed capacity of the 15 sanatoria is 2014 beds In 1944 there were a total of 699 deaths If we exclude the 165 deaths which occurred in the State mental hospitals, prisons and veterans hospital, there were 3.9 beds per annual death This is well above the standard of 2.5 beds per annual death Thus, at first notice, it would seem as though there were sufficient beds to take care of our case load It is to be expected that with the use of the mobile x-ray units for case-finding the active case load in this State will be greatly increased The total Minnesota experiences to date indicate that about 1.5 per cent of apparently healthy persons given x-ray examinations show significant tuberculosis shadows However, about 0.1 per cent of all persons examined will require sanatorium care for observation or treatment

If the 0.1 per cent rate continues in the rest of the State it is to be expected that instead of having bed vacancies in the sanatoria, present case-finding methods will uncover more cases than there are bed vacancies It may be necessary in order to utilize all available beds that some patients unable to obtain hospitalization in their own area be hospitalized in an adjacent sanatoria for such temporary hospitalization Fortunately, the large majority of cases found on x-ray surveys are in the early stage and should require only a short stay in the sanatorium It is therefore estimated that the over-load of patients in the sanatoria will be only of a short duration, perhaps five years following a survey, after which time vacancies created in sanatoria will be of a more permanent nature Perhaps for this period one may estimate the bed requirements at five beds per annual death

To the question as to whether certain small sanatoria should



be closed, we believe the answer is to wait and see what the surveys will produce. It is no doubt true that the smaller sanatoria do not have all the facilities required for adequate surgical care of the tuberculous. Perhaps, in order to make such treatment immediately available to all Minnesota residents, it might be well to use the smaller sanatoria for the chronic ambulatory and rehabilitation cases and the larger sanatoria for the patients in need of a complete treatment center. At any rate, an effective tuberculosis program calls for the immediate hospitalization of all infectious cases (actual and potential). That is basic.

### *Rehabilitation*

Because of the chronic nature of the disease, many patients are required to remain in a sanatorium for long periods of time and are physically incapable of full time employment upon their discharge from the sanatorium. Because of economic necessity, many of them are compelled to return to their employment earlier than is desirable or to employment which is detrimental to their future health.

The purpose of rehabilitation is two-fold, first, to return to the patient his self-respect by directing him into avenues of work in which he is not discriminated against nor vocationally handicapped and second, to return to him his economic independence as rapidly as his health permits.

The rehabilitation program should consist of the following functions:

- (1) Mental restoration,
- (2) Physical restoration,
- (3) Vocational and medical guidance,
- (4) Training,
- (5) Placement

Methods chosen to operate the rehabilitation program must be combined into an orderly process. It is necessary at all times to select carefully the patients eligible for rehabilitation care. Under no circumstances should anyone be compelled to accept rehabilitation.

The rehabilitation program in Minnesota is a function of the State Department of Education. Seventy persons, or 14.5 per cent of the total disabled persons rehabilitated in 1945 were former tuberculous patients. It is hoped that this service will reach more persons eligible for it. On July 6, 1943 Congress passed the Borden-LaFollette Act. This legislation made possible vocational rehabilitation to all disabled persons who can profit from this service and broadened the scope of the service under Federal-State program.

Voluntary health and welfare agencies can assist in the rehabilitation program in four ways

- (1) Provide teachers and occupational therapists to the smaller sanatoria
- (2) Provide supplemental financial and material assistance to dependents of patients
- (3) Educate management and general public not to discriminate against the employment of selected ex-patients
- (4) Provide supplemental financial or material assistance to trainees either as grants or loans

### *Prevention*

In the foregoing discussion under case-finding, hospitalization and treatment, and rehabilitation, one can readily recognize the value of early case-finding, early isolation, and adequate rehabilitation as potent factors in the prevention of the spread of tuberculosis

The following additional remarks are worthy of emphasis at the risk of repetition

- (1) The value to the community of isolating open cases is so great that it should be incumbent upon them to provide free sanatorium care for all their residents with active tuberculosis and to those non-residents who are found to be infectious. The cooperation of the attending physician, the consultant, the health officer and the community is necessary
- (2) Once a patient has been admitted to the sanatorium, he should remain there until discharged by the Superintendent as having received maximum hospital care and being non-infectious
- (3) Follow-up examinations of post-sanatorium cases or observation cases should always include submission of sputa specimens to the State Department of Health Laboratories
- (4) Periodic chest examinations (or tuberculin tests) of teachers, school employees and contacts of cases. Teachers should be required to have their examinations at time of employment and at least every two years thereafter
- (5) The annual chest x-ray examination of barbers, beauty operators, food handlers, bartenders and the like would assist in locating active tuberculosis in persons coming in close association with the general public. The value of this procedure in tourist or trade centers can not be overstated
- (6) Improvement of nutrition and housing

In this proposed expanded tuberculosis control program with the use of mobile x-ray units, it is expected that the combined coordinated attack on tuberculosis by the State Department of Health, sanatoria, and other official and voluntary health and welfare agencies will produce results. It is not the desire of the State Department of Health to interfere nor to hinder the good work of the sanatoria and other agencies which has been so fruitful in the past, but rather to lend them assistance and the authority which is at our means to provide

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# The Medical Management of the Bronchiectatic Patient\*

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The clinical entity known as bronchiectasis is being recognized a great deal more than formerly. This disease was first described by Laennec in 1819, and received a good deal of study by the pathologists. Since there was no satisfactory treatment, the practitioners gave little attention to it until Killian introduced the bronchoscope in 1880. Stimulated by Jackson, further study of the bronchial tree has added to our knowledge of bronchiectasis, and this study and improved methods of diagnosis are partly responsible for the increased reports on this disease.

During the past decade the surgical treatment of bronchiectasis has gained favor. Unfortunately only about one-half the cases are suitable for surgical treatment. This leaves a vast number of individuals who are still wholly dependent on medical treatment for such relief as they can get. Because of the physical, social, and economic handicaps of this crippling disease, these people are entitled to as much alleviation as can be given them by medical management.

When trying to establish or to evaluate a treatment, it is well to keep in mind the pathology and the pathologic physiology which one is trying to correct. There have been expressed several theories of the etiology of bronchiectasis. After all has been said, however, it seems to me that the essential elements are bronchial obstruction and infection. To me, this is bronchiectasis. In the medical treatment of this condition the aim is first to relieve the obstruction as much as possible, thereby allowing re-aeration of the infected lung tissue. This in itself aids in the second objective, that is, to inhibit the growth of the pathogenic bacterial flora, thus relieving to some extent the unpleasant symptoms due to these organisms.

## *Prevention*

The preventive treatment of bronchiectasis is largely the responsibility of the pediatrician. All respiratory diseases in children should be treated most carefully and thoroughly. Convalescence should be prolonged whenever necessary to restore the child to

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good general health and to re-aerate all parts of the lungs Foreign bodies in the bronchi should be removed immediately to prevent secondary changes at their point of lodgment and beyond Acute infections in the bronchial tree and lungs of adults should receive the same careful attention, especially influenza, bronchial pneumonia, and atypical pneumonia Postoperative atelectasis should be relieved immediately by bronchoscopy if necessary

### *General Measures*

It is axiomatic to state that bronchiectatic patients should be kept in the best possible general health Foci of infection, particularly about the mouth and upper respiratory tract should be removed when possible Adequate nutrition, including a sufficient supply of vitamins and minerals, is important These patients, as far as is humanly possible, should avoid exposure to respiratory infections and exposure to inclement weather Where it is economically possible, it is often helpful for them to live in an equable climate, at different locations at different seasons if necessary The use of autogenous vaccines is permissible, though there is nothing specific in their action, nor do they give spectacular results I have used them for years They have never harmed a patient, and in many instances, patients have had fewer acute respiratory episodes during the winter and spring months, and in many instances the bronchiectatic sputum has decreased I never promise a patient any favorable results from their use, and I do not insist on their use if a patient objects This, I deem a wise and honest precaution

The administration of expectorant cough mixtures, iodides, creosote, and the hypodermic injection of some form of iodide should be tried These drugs help to deodorize and to thin the secretions, thereby facilitating drainage When there is not sufficient natural sunshine, the use of ultraviolet light is permissible The administration of sulfonamides by mouth and penicillin intramuscularly should be used in selected cases Penicillin can be given once daily, 300,000 units at a dose, until two or three million units have been given This can be repeated as indicated Toxic effects are unusual and mild When fusiform bacilli and spirochetes are numerous in the sputum, neoarsphenamine may be given intravenously, but in my experience this has not proved of any decided benefit Adrenalin sometimes relaxes the bronchi enough to help promote drainage

### *Local Measures*

Unless there is some distinct contra-indication, every bronchiectatic patient should have at least one bronchoscopic examina-

tion and drainage This often relieves the bronchial obstruction by the removal of polyps, tenacious secretion or plugs of debris, or simply by dilatation of the bronchus Postural drainage arranged to suit each individual is of prime importance This is best done by having the patient lie on a cot, the foot of which is elevated to about a forty-five degree angle He is instructed to lie five to ten minutes each on his back, on his abdomen, and on each side He should cough and breathe deeply several times in each position For drainage of the bronchi in the upper lobes the patient's chest is propped up, and he turns from side to side while coughing and breathing deeply

The instillation into the bronchial tree of iodized oil, by its mechanical action, floats out a great deal of secretion It may have a slight antiseptic action on the lining of the bronchi, although sufficient iodine is not liberated to be of much benefit in this fashion I doubt that oft repeated instillations are of benefit, and may cause harm The same is true of bronchial lavage The use of antiseptic solutions directly in the bronchial tree is of doubtful value, and often produces bronchitis and pneumonitis The use of steam inhalations with some volatile medicament, such as tincture of benzoin, relieves acute bronchial irritation Vaporized penicillin offers some hope of temporary abatement of the infectious process The success of this treatment depends on the content of the bronchial flora, on its proper use by the patient, and on his persistence An oxygen tank with a regulator is attached to a special nebulizer The patient places the mouth piece of the nebulizer well back in his mouth and sucks in a long breath as the oxygen flows over the solution of penicillin in the nebulizer This carries the fine vapor into the bronchi More penicillin will be retained if the patient holds his breath for a few seconds after each inhalation I start my patients with a solution containing 10,000 units to the cubic centimeter of normal salt solution If there is no evidence of bronchial irritation this is rapidly increased to 30,000 or 40,000 units per cubic centimeter In this way, the patient can take from 100,000 to 200,000 units a day I have used this treatment for over a year on patients without any untoward affects It gives only temporary relief, but it can be repeated without harm If the oxygen apparatus is not available, the patient can use the hand bulb that comes with the nebulizer, though that is not quite as satisfactory

It is realized that none of the above measures offer any specific remedy or cure for bronchiectasis, but some of them will bring some measure of relief to an otherwise miserable patient They should be tried in those cases not suitable for surgery

## SUMMARY

More cases of bronchiectasis are being recognized About one-half of the patients are not suitable for surgical treatment, but they deserve as much relief as medical care can offer Relief of bronchial obstruction, promotion of drainage, and inhibition of the infectious process offer some hope of temporary restoration of physiologic function We should strive by these means to give an otherwise sick and miserable patient some measure of relief and help restore him to his rightful place in society

## RESUMEN

Se están descubriendo más casos de bronquectasia El tratamiento quirúrgico no es aplicable a la mitad de los enfermos, más o menos, pero ellos merecen tanto alivio como pueda ofrecerles la atención médica El tratamiento de la obstrucción bronquial, el establecimiento de drenaje y la inhibición del proceso infeccioso ofrecen alguna esperanza de la restauración temporaria de la función fisiológica En esta forma debemos esforzarnos por proporcionarle al paciente, de otro modo enfermo y en un estado miserable, alguna medida de alivio, y a ayudar a restaurarlo a su puesto legítimo en la sociedad

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# Subdiaphragmatic Aberrant Pulmonary Tissue\*

## (Case Report)

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The feasibility and popularity of exploratory thoracotomy for thoracic lesions has led to the discovery of congenital anomalies previously diagnosed only at the autopsy table. We present an unusual congenital malformation—accessory pulmonary tissue contained within the sac of a diaphragmatic hernia.

### CASE REPORT

E S, Case number 213013, a colored male infant nine months of age, was admitted to the University of Virginia Hospital on April 28, 1945. The mother's pregnancy and delivery were apparently normal. One previous pregnancy ended in stillbirth, another infant died of convulsions early in life and a third child at present is in good health. The mother stated that the patient had vomited "almost every feeding" since birth. The vomiting as described was projectile in nature and took place almost immediately after feeding. The vomitus consisted of undigested food without blood or mucus. No choking, coughing or cyanosis accompanied the vomiting. The bowel habits were normal and the stools, although small in amount, were normal in appearance. Obviously the child had failed to gain weight normally but had remained mentally alert.

Treatment prior to six weeks before admission had consisted of "drops" (? Atropine) taken by mouth. Failure to respond to this treatment prompted admission to a hospital elsewhere where after six weeks of medications the symptoms persisted. A diagnosis of diaphragmatic hernia was suspected and admission to the University of Virginia Hospital was advised.

*Physical Examination* The general appearance of the patient was that of a poorly developed and nourished child in no acute distress. The weight was ten pounds, ten ounces, and the temperature was normal. The abdomen was distended and tympanitic, but no masses were palpated. Both testes were undescended, and phimosis was present. The remainder of the physical examination was essentially negative.

*Laboratory Studies* Routine urine and stool examinations were negative. The hemoglobin was 13 grams (84.4 per cent), the erythrocyte count 4.96 million, and the leucocyte count 5,800 with 23 per cent segmented polymorphonuclear cells, 69 per cent lymphocytes, and 8 per cent monocytes. The Wassermann and tuberculin tests were negative.

*Roentgen Studies* On April 30th barium studies of the gastro-intestinal tract were made. The esophagus was found to be shorter than

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\*From the Department of Surgery and Gynecology, University of Virginia School of Medicine, and University Hospital, Charlottesville, Virginia.



normal and moderately dilated. The barium passed quickly into a very large gas-filled stomach. The cardiac end of the stomach protruded through a diaphragmatic defect about two centimeters in diameter and formed an apparent herniation near the esophageal hiatus (Fig 1). The barium readily passed through the pylorus and hourly films revealed a normal passage through the intestinal tract. The lung fields were clear.

The diagnosis of diaphragmatic hernia seemed confirmed by the roentgen studies but the constantly large and tympanitic stomach seemed to indicate an increase in vagal tonus. On this assumption, atropine sulfate (five minims three times daily) was administered for fifteen days.



*Figure 1* Roentgenogram after ingestion of barium shows the moderate dilatation of the esophagus, the marked distention of the stomach and the herniation of the stomach through the diaphragm

and reexamination of the stomach by x-ray revealed some diminution in the size but the abdomen was still distended and tympanitic. There had been no appreciable gain in weight. Exploratory thoracotomy with repair of the diaphragmatic defect seemed imperative.

*Operation.* On May 24th the left hemithorax was explored by one of us (A.R.V.). A low postero-lateral incision was employed and the 8th rib resected subperiosteally from the transverse process to the cartilage. Upon opening the pleural cavity an obvious diaphragmatic herniation was seen posteriorly. There were no adhesions and the lower lobe of the lung was retracted easily to give excellent exposure of the whole diaphragm. The herniated mass was about the size of a hen's egg and was covered with thin tendinous diaphragm. By palpation it contained a solid viscus which could not be reduced. The thin diaphragm over the apex of the mass was divided and a dark red, friable mass of tissue presented. It was assumed at first that the spleen had become partially strangulated in the sac. With great difficulty the hernia sac was dissected from the mass. The dome of the diaphragm was divided radially in an anterior direction from the sac in order to better identify the subdiaphragmatic organs and to aid in the dissection of the contents of the hernia sac. The stomach, liver, spleen, and left kidney were readily identified and were normal on gross examination. A small portion of the stomach could at times have entered the sac beside the solid mass. This would explain the x-ray appearances. The mass contained in the hernia sac was considered to be an ectopic or accessory organ, probably kidney or liver from its appearance. With great difficulty it was dissected from the diaphragm and the posterior parietal peritoneum. Num-



Figure 2 Photomicrograph of specimen showing pulmonary tissue with blood in the alveoli

erous large vessels entered the mass, apparently from the aorta. One finger-sized projection was intimately attached to the esophagus but did not enter the lumen thereof. After ligation of the vessels, the mass was completely mobilized and removed. The diaphragmatic defect was then closed with interrupted sutures of fine silk. As the chest wall was being closed, the child's condition, which had been fairly good throughout, became suddenly worse and he died. The cause of death was probably operative shock.

*Postmortem Examination.* Examination of the body shortly after death revealed no significant abnormalities other than those resulting from the recent operation. The right kidney was small, weighing only ten grams as compared with the left which weighed twenty-five grams. No other structural defects were noted in either kidney. No other congenital anomalies were present. There was revealed no explanation of the persistently distended stomach.

The resected specimen measured 4 x 3 x 2 centimeters. On section "it was found to be dark reddish-brown throughout except for the center which was cystic and had a bloody-like material in it." The cystic cavity measured from one-half to one centimeter in diameter. Microscopically the specimen represented lung tissue, markedly congested with all of the alveoli filled with red blood cells (Fig. 2). There was no evidence of pneumonia or neoplasm.

## DISCUSSION

A review of the literature revealed reference to two types of accessory or aberrant lung.<sup>3</sup> One occurs in the upper chest, the so-called tracheal lobe, and is connected by a bronchus to the trachea. The other, the so-called lower accessory lung, is found in the lower chest or upper abdomen and consists of sequestered pulmonary tissue which has no connection with the bronchial tree. Of the latter type thirty-seven cases, including ours, have been recorded.

Although most cases reported were in stillborn infants the presence of this anomaly alone is not incompatible with life. Davies and Gunz<sup>2</sup> mention von Meyenburg's (1914) case in a six year old child, Rektorzik's case (1861) in an eighteen year old girl, and Springer's case (1898) in a forty-nine year old woman. As can be seen from Table I the anomaly occurs most frequently on the left side, only four cases of the thirty-seven being on the right. Diaphragmatic herniae are not infrequently associated with lower aberrant or accessory lungs, occurring in eleven (29.7 per cent) of the cases. The associated diaphragmatic herniae could be due to a hindrance to the closure of the diaphragm by the presence of this additional lung tissue extending downward toward the coelomic cavity.

There are many theories about the formation of this anomaly. However, we will briefly mention two which seem most plausible. The first theory, propounded by Cockayne and Gladstone,<sup>1</sup> involves the principle of sequestration. They state that at certain

embryonic stages, adhesions of lung mesenchyma to the coelomic mesothelium or to structures covered by this tissue are rather frequent. Whether this adherence is due to lack of separation of the lung mesenchyma from the mesenteric tissue, or to fusion of the two tissues, is undecided. However, these adhesions cause the lung mesenchyma to be displaced downward along with the foregut. This could plausibly account for the occurrence of diaphragmatic hernia and also for the attachment of the accessory lung to the lower esophagus and stomach, a finding in our case.

The second theory is based on the possibility of the development of a second primitive respiratory tract from the digestive tract.<sup>3</sup> This could be accomplished by the downward displacement of cells from the tracheoesophageal ridge with the growing foregut. A fact favoring this theory is that in almost every case the blood supply is derived from the aorta or the adrenal arteries. Venous drainage is usually through the azygos or hemiazygos veins.

It has been suggested that the occurrence of this anomaly on the left side is a consequence of the asymmetry that usually occurs in the early human embryo.<sup>2</sup>

From Table I it is seen that the present case is the sixth reported occurring beneath the diaphragm, and is the second reported in this location associated with a diaphragmatic hernia.

Thirty-six of the thirty-seven cases were discovered at autopsy. The present case appears to be the first diagnosed during life by an exploratory operation.

TABLE I  
REPORTED CASES OF LOWER ACCESSORY LUNG  
(including present case)

Author	Side		Diaphragm		Diaphragmatic Hernia
	Right	Left	Above	Below	
Beneke		+		+	+
Bert and Fischer		+	+		
Carter and Osborn		+	+		
Cockayne and Gladstone		+	+		+
Davies and Gunz		+	+		+
Davies and Gunz		+	+		
Duerck	+		+		
Freedlander and Gebauer		+	+		
Gruber		+	+		+
Hückel		+	+		
Humphry		+	+		

Author	Side		Diaphragm		Diaphragmatic Hernia
	Right	Left	Above	Below	
Iwanoff		+	+		+
Kaplan		+	+		
Kaup I		+	+		+
Kaup II		+	+		+
Kohn		+	+		+
Lewisohn		+	+		
Morelli	+		+		+
Muller		+	+		
Muus		+	+		
Nordmann		+	+		+
Plineda	+		+		
Quenzel		+	+		
Rektorzik		+	+		
Robsmann		+		+	
Rokitansky		+	+		
Ruge		+	+		
Sachs		+	+		
Scheidegger		+	+		
Seltsam		+		+	
Simpson	+		+		
Springer		+	+		
Valle and White		+		+	+
Vogel I		+		+	
Vogel II		+		+	
von Meyenburg		+	+		
Wechsberg		+	+		

\*Gruenfeld and Gray<sup>3</sup> cited all of the above cases except those of Iwanoff, Morelli, and Nordmann, whose cases were cited by Davies and Gunz<sup>2</sup> in the presentation of their own patients

## REFERENCES

- 1 Cockayne, E. A., and Gladstone, R. J. "A Case of Accessory Lungs Associated with Hernia Through a Congenital Defect of the Diaphragm," *J Anat*, 52: 64, 1917
- 2 Davies, D. V., and Gunz, F. W. "Two Cases of Lower Accessory Lung in the Human Subject," *J Path and Bact*, 56: 417, 1944
- 3 Gruenfeld, G. E., and Gray, S. H. "Malformations of the Lung," *Arch Path*, 31: 392, 1941

# EDITORIAL

## THE COLLEGE RESEARCH PROGRAM

Every Fellow, Associate Fellow and member of the College of Chest Physicians by reason of his expert information owes the world not only his routine services, but also any additional knowledge he is capable of contributing. Among our 2,000 members are many now engaged in research in various diseases of the chest and closely related subjects. Some are receiving support from institutions and research foundations, while others are personally financing their projects. Probably there are few, if any, who do not have research problems in progress or in mind. All could profit from and contribute to advancement of knowledge through a research organization within the College.

The assemblage of all available knowledge on any given subject is exceedingly important and often requires extensive research of the literature. However, unless this is done, scientific and clinical investigations are likely to be repeated or instituted with the lack of important facts already established. There are numerous subjects in the field of chest diseases for which all available information should be assembled. Thereafter the gaps in our knowledge should be filled in through scientific and clinical investigation.

The scope of the College is worldwide, therefore, in its research activities consideration must be given to each disease and condition that attacks the human chest. Every effort should be made to avoid duplication of research work already in progress by other organizations. The field is so large and the number of qualified workers is so small that duplication of effort among organizations would only postpone the discovery of much-needed information.

Dr. Charles M. Hendricks, a founder and now President of the College, has long appreciated the importance and, in fact, the necessity of organized research in chest disease. He has now appointed a Research Council, whose duty it will be to investigate various research projects that may be presented for consideration. Those that are regarded worthy will be given all possible support, including financial aid as funds permit.

A sizable research fund will be made available. Already, through the efforts of Dr. Hendricks several College Fellows have subscribed \$1,000 each and a number of others have expressed their intention to contribute this amount. In the near future a campaign will be launched, inviting every Fellow, Associate Fellow and member of the College to have a part in financing this important work. The immediate goal is \$100,000, which should be readily forthcoming from the membership. Our annual dues are ridiculously low when one considers the benefits that accrue to each member. So much has been received for so little financial outlay that we can now take advantage of the opportunity to contribute to a fund which will perpetuate the good name and work of the College and promote the control of diseases of the chest throughout the world. With \$100,000 as the initial fund much larger sums should be procurable from other sources.

The College must contribute knowledge pertaining to diseases of the chest if it is to continue to improve its already high standing among international medical organizations. Knowledge can be contributed only through research which, in turn, can be executed only through adequate funds. Therefore, the Research Council must succeed

J.A.M.



Seated, left to right Dr Roberto Machado, Dr Rene G Mendoza, Dr Paul A Turner, Dr David Waterman, Dr Louis Mark, Dr Carl O Aven, Dr J Winthrop Peabody, Dr Edward W Hayes, Dr Octavio Rivero, Dr Minas Joannides, Dr Herbert L Mantz Standing Dr Antonio Rodriguez Diaz, Dr Ricardo Riera, Dr I L Robbins unidentified, Dr Chevalier L Jackson Dr Milton S Lloyd, Dr Benjamin L Brock Dr William A. Hudson, Dr Alvis E Greer, Dr Osler Abbott, unidentified, Dr Sydney Jacobs, Dr Duane Carr Dr William E Denman, Mr Murray Kornfeld unidentified Dr John Roberts Phillips, Dr Arnaldo Coro, Dr A J Steiner, unidentified, Dr Ricardo Sanchez Acosta

# College Chapter News

## CUBAN CHAPTER

On Tuesday, November 5, the day after the meeting of the Southern Chapter of the College at Miami, a number of College officials, and their wives and other members of their families, journeyed to Havana to attend a meeting of the Cuban Chapter of the College. Following is a list of those who made the trip to Havana:

Dr Osler Abbott, Emery, Georgia  
Dr and Mrs Carl C Aven, Atlanta, Georgia  
Dr Benjamin L Brock, Oteen, North Carolina  
Dr Duane Carr, Memphis, Tennessee  
Dr William E Denman, Memphis, Tennessee  
Dr and Mrs Alvis E Greer, Houston, Texas  
Dr and Mrs Edward W Hayes, Monrovia, California  
Dr and Mrs William A Hudson, Detroit, Michigan  
Dr and Mrs Chevalier L Jackson, Philadelphia, Pennsylvania  
Dr and Mrs Sydney Jacobs, New Orleans, Louisiana  
Dr and Mrs Minas Joannides, Chicago, Illinois  
Mr and Mrs Murray Kornfeld, Chicago, Illinois  
Dr Milton S Lloyd, New York, New York  
Miss Harriet E Lumm, Chicago, Illinois  
Dr and Mrs Herbert L Mantz, Kansas City, Missouri  
Dr Louis Mark, Columbus, Ohio  
Dr and Mrs J Winthrop Peabody, Washington, D C  
Dr and Mrs John Roberts Phillips, Houston, Texas  
Misses Dana and Ann Phillips, Houston, Texas  
Dr and Mrs I L Robbins, New Orleans, Louisiana  
Miss Faye Robbins, New Orleans, Louisiana  
Dr and Mrs A J Steiner, St Louis, Missouri  
Dr and Mrs Paul A. Turner, Louisville, Kentucky  
Miss Joeann Turner, Louisville, Kentucky  
Dr David Waterman, Knoxville, Tennessee

A scientific session was held at the Mercedes Hospital, Havana, on Tuesday evening. The following program was presented:

"Pneumoperitoneum," Dr Sydney Jacobs, New Orleans, Louisiana  
"Esophageal Surgery," Dr Minas Joannides, Chicago, Illinois  
"Histoplasmosis," Dr Herbert L Mantz, Kansas City, Missouri  
Motion Pictures of an Operation on the Heart Dr Osler Abbott,  
Emery, Georgia

Dr Antonio Rodriguez Diaz discussed Dr Joannides' paper and presented his own cases on surgery of the esophagus. Dr Jackson gave a brief talk on Pan American activities of the College. More than one hundred physicians attended the scientific session. Transportation to the Mercedes Hospital, a few blocks from the Hotel Nacional, was furnished by Drs Rivero and Mendoza.

The Cuban Chapter was host at a dinner the next evening, November 6th, which was given at the Restaurant Paris in the Plaza de la Catedral. Talks were given by Dr E W Hayes, Monrovia, California, Chairman of the Council on Undergraduate Medical Education of the College, Dr J Winthrop Peabody, Washington, D C, Chairman of the Council on Postgraduate Medical Education, and Dr Gustavo Aldereguia of Havana, Past President of the Cuban Chapter. Dr Aldereguia made a brilliant



## CUBAN CHAPTER MEETING, NOVEMBER 5, 1946

Scientific Session, Mercedes Hospital, Havana



Standing, left to right: Dr. Edward W. Hayes, Monrovia, California; Dr. J. Winthrop Peabody, Washington, D. C.; Dr. Chevallier L. Jackson, Philadelphia, Pennsylvania; Dr. Octavio Rivero, Havana, Cuba; Dr. Louis Mark, Columbus, Ohio; Dr. Minas Joannides, Chicago, Illinois; unidentified Dr. Rene G. Mendoza, Havana, Cuba; Mr. Murray Kornfeld, Chicago, Illinois.

speech and concluded his talk with the following message of welcome to the delegates from the United States "Like the old stones of the old buildings of old Havana we take you into our hearts and bid you welcome" Dr Octavio Rivero, President of the Cuban Chapter, presided at the dinner meeting and introduced the speakers

The Havana newspapers, El Pais and El Mundo, carried articles and photographs concerning the meeting

Dr Antonio Navarrete, Regent of the College for Cuba, made the arrangements for this excellent meeting with the assistance of Dr Octavio Rivero and Dr Rene Garcia Mendoza, President and Vice-President of the Cuban Chapter Unfortunately, however, Dr Navarrete was compelled to be away from Havana at the time of the meeting and his absence was deeply regretted by the College members

Officers of the Cuban Chapter of the College are

Dr Octavio Rivero Partagas, President

Dr Rene Garcia Mendoza, Vice-President

Dr Orfillo Suarez de Bustamente, Secretary-Treasurer

Past Presidents

Dr Alfredo Antonetti

Dr Gustavo Aldereguia

Dr O Suarez de Bustamente

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### INDIANA CHAPTER

On October 30, 1946, a joint meeting of the Indiana Chapter of the American College of Chest Physicians and the Anti-Tuberculosis Committee of the Indiana State Medical Association was held in Indianapolis It was a dinner meeting and was attended by approximately forty-five members and guests The following program was carried out

Address

"Report of Routine Photo-Fluorographic Chest Examinations of General Hospital Admissions," Dr Harold C Ochsner, Indianapolis

Discussers

Dr Raymond C Beeler, Indianapolis

Dr H M Draper, F C C P, Fort Wayne

Dr E W Custer, F C C P, South Bend

During the X-Ray Conference which followed the program, there was considerable discussion about x-ray survey work

At the business meeting the following officers were elected for the Indiana Chapter of the College

Dr J V Pace, New Albany President

Dr O T Kidder, Fort Wayne, Vice-President

Dr H B Pirkle, Rockville, Secretary-Treasurer

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### MISSOURI CHAPTER

The Missouri Chapter of the College met in conjunction with the Southwest Clinical Conference on October 6 at Kansas City Twenty-five members and guests attended the dinner and meeting Dr Samuel H Snider, President of the Chapter called the meeting to order The chairmen of the various committees were named

Dr Carl Pfuetze, F C C P, Cannon Falls, Minnesota, gave an excellent and completely illustrated lecture on streptomycin with case reports. The meeting was closed with an informal X-Ray Conference which was enjoyed by all.

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### NEW JERSEY CHAPTER

The Winter Scientific Meeting of the New Jersey Chapter was held on December 11 at the Jersey City Medical Center. The following program was presented:

- "A Case of Cystic Disease of the Lung," Dr Thomas DeCeelo and Dr I E Gerber
- "The Diagnosis of Mediastinal Tumors," Dr Herbert C Maler
- "A Case of Systemic Blastomycosis," Dr Samuel Cohen
- "Spontaneous Hemopneumothorax Complication Requiring Surgical Management," Dr Benjamin J Elwood
- "Penicillin in the Therapy of Pulmonary Actinomycosis," Dr Abraham E Jaffin
- "Case Report Disseminated Coccidioidomycosis," Dr Samuel Koopstein

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### OHIO CHAPTER

Dr E E Kirkwood, Youngstown, President of the Ohio Chapter of the College, has announced the following committee appointments:

#### Program Committee

- Dr David W Heusinkveld, Cincinnati, Chairman
- Dr Herman J Nimitz, Cincinnati
- Dr Louis Mark, Columbus

#### Medical Education Committee

- Dr George M Curtis, Columbus, Chairman
- Dr R C McKay, Cleveland
- Dr John H Skavlem, Cincinnati

#### Membership Committee

- Dr Karl P Klassen, Columbus, Chairman
- Dr Edgar P Adams, Warren
- Dr Harold G Curtis, Cleveland

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### PACIFIC NORTHWEST DISTRICT CHAPTER

Dr Frank I Terrill, Deer Lodge, Montana, President of the Pacific Northwest District Chapter of the College, has made the following committee appointments for the chapter:

#### Medical Education Committee

- Dr Frederick Slyfield, Seattle, Washington
- Dr William S Conklin, Portland, Oregon
- Dr Grover C Bellinger, Salem, Oregon
- Dr Irvin R Fox, Eugene, Oregon

### Membership Committee

Dr John E Nelson, Seattle, Washington  
 Dr Frank S Miller, Spokane, Washington  
 Dr Howard L Hull, Yakima, Washington  
 Dr J Karl Poppe, Portland, Oregon  
 Dr W Elliott Harrison, Vancouver, B C

### Program Committee

Dr Byron F Francis, Seattle, Washington  
 Dr Cedric Northrop, Seattle, Washington  
 Dr Orval F Swindell, Boise, Idaho  
 Dr John S Sral, Elma, Washington  
 Dr John F Steele, Tacoma, Washington

### Nominating Committee

Dr James M Odell, The Dalles, Oregon  
 Dr Frederick Slyfield, Seattle, Washington  
 Dr William S Conklin, Portland, Oregon

## PERUVIAN CHAPTER

The Peruvian Chapter of the College held their Second Annual Meeting at the Dispensario Central, Lima, Peru, on November 11, 12 and 13, 1946. Dr Ovidio Garcia Rosell, Governor of the College for Peru, and Past-President of the Peruvian Chapter, announced that the meeting was very successful. The following excellent program was presented:

### November 11th

"Imágenes redondeadas en la tuberculosis pulmonar,"  
 Dr Max Espinoza Galarza, F C C P, Lima  
 "Algunos aspectos de la asistencia antituberculosa en el Callao,"  
 Dr Luis E Hubner, F C C P, Callao  
 "Asistencia dispensarial de los adolescentes,"  
 Dr Victor Narvaez Obeso, Lima  
 "Catastro Roentgenografico en el Departamento Municipal de Sanidad," Dr Humberto Valderrama, Lima

### November 12th

"Imágenes planigráficas de perfil,"  
 Prof Dr Ovidio Garcia Rosell, F C C P, Lima  
 "Cavernas no visibles a la radiografía plana,"  
 Dr Leopoldo Molinari Balbuena, F C C P, Lima  
 "Enfermedad de Hodgkin de forma mediastinal,"  
 Dr Horacio Cachay Diaz, Lima  
 "Cavernas empastadas,"  
 Dr Ramon Vargas Machuca, F C C P, Lima

### November 13th

"Bronconeumonías atípicas,"  
 Dr Juan Escudero Villar, F C C P, Lima  
 "Tuberculosis en internados escolares,"  
 Dr Roman del Castillo, Lima  
 "Un caso de parálisis transitoria del frenico,"  
 Dr Jorge Sarmiento E, Lima

The business meeting of the Peruvian Chapter was held on the last day of the meeting and the present officers were re-elected for the coming year. The officers of the chapter are

Dr Max Espinoza Galarza, Lima, President  
Dr Luis Cano Girona, Lima, Vice-President  
Dr Ramon Vargas Machuca, Lima, Secretary  
Dr Luis E Hubner, Callao, Treasurer  
Dr Mario Pastor, Lima, Bibliothecary

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### WISCONSIN CHAPTER

Dr Alfred A Busse, Jefferson, Wisconsin, President of the Wisconsin Chapter of the College has announced the following committee appointments

#### Program Committee

Dr A. L. Banyai, Milwaukee, Chairman  
Dr Phillip F Feingold, Milwaukee  
Dr Ethan Pfefferkorn, Oshkosh  
Dr John K Shumate, Madison

#### General Arrangements Committee

Dr Mischa Lustok, Milwaukee, Chairman  
Dr Earl E Carpenter, Superior  
Dr A. S. Kimball Jr, Madison  
Dr Leonard W Moody, Bayfield  
Dr Valentine O'Malley, Wauwatosa  
Dr Marres H Wirig, Madison

#### Educational Committee

Dr Ethan Pfefferkorn, Oshkosh, Chairman  
Dr H H Christensen, Wausau  
Dr William T Clark, Janesville  
Dr John C Dundee, Waukesha  
Dr Karl Kassowitz, Milwaukee

#### Publicity and Reception Committee

Dr Laurie L. Allen, Milwaukee, Chairman  
Dr G D Guilbert, Wood  
Dr Douglas Guthell, Milwaukee  
Dr Paul Jahn, Milwaukee

#### Membership Committee

Dr Leon H Hirsh, Milwaukee, Chairman  
Dr Isabel Gadzikowski, Milwaukee  
Dr William B Ford, Milwaukee  
Dr Thomas C Nuzum, Janesville

#### Scientific Arrangements Committee

Dr George H Jurgens, Milwaukee, Chairman  
Dr Paul Elsele, Waukesha  
Dr John P Fetherston, Milwaukee  
Dr Stanley R Szymanski, Wood

### X-Ray Conference Committee

Dr William T Clark, Janesville, Chairman  
Dr Henry A Anderson, Stevens Point  
Dr Harry Barrell, Waukesha  
Dr John W Connell, Fond du Lac  
Dr Esther Goldberger, Milwaukee  
Dr Paul E Pifer, Kenosha

### Nominating Committee

Dr Carl O Schaefer, Racine, Chairman  
Dr Andrew L Banyai, Milwaukee  
Dr Alfred A Busse, Jefferson

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## College News Notes

### BOARD OF EXAMINERS

Oral and written examinations for Fellowship in the College were given at Miami, Florida, on November 3, 1946, at the time of the Semi-Annual Meeting of the Board of Regents. Dr Alvis E Greer, Chairman of the Board of Examiners, conducted the examinations with Dr E W Hayes and Dr Minas Joannides assisting.

The following candidates for Fellowship successfully passed the oral and written examinations

W W Coulter, M.D, Sanatorium, Texas  
Sheldon E Domm, M.D, Knoxville, Tennessee  
P M Huggin, M.D, State Park, South Carolina  
Timothy Liang, M.D, Cassadaga, New York  
Walter Raab, M.D, Glenn Dale, Maryland  
Leon Ross, M.D, Brecksville, Ohio  
E A Sindel, M.D, Bethlehem, Pennsylvania  
Morris M Snyder, M.D, Chicago, Illinois

The questions used in the written examinations were as follows

#### *Thoracic Diseases (Medical Aspects)*

##### Part I

Discuss the pathogenesis of pulmonary emphysema

##### Part II

(Answer 3 of the 5 questions)

(1) Discuss the differential diagnosis of early pulmonary carcinoma and early pulmonary tuberculosis

(2) Outline the important steps in the treatment of active clinical or secondary pulmonary tuberculosis in a young adult as they should be carried out until the patient regains his health. Give the important factors which might indicate the various steps which may be used in the treatment of such a case

(3) Discuss the contraindications for artificial pneumothorax

(4) Consulted by a female patient 42 years old, married and with no children, who gives a history of always having been well previously and apparently happy, who complains of the following symptoms: sleeps poorly for the past three or four years, tired with lack of endurance, some coughing and hacking, raises a dram or so of sputum in 24 hours, mostly mucoid, has lost 4 pounds the past month, menses regular and

normal Patient states that she smokes a package of cigarettes a day, takes a highball occasionally. The onset of symptoms, except insomnia, was 5 months previous to the date of examination. X-ray pictures of the chest (lungs) are negative. Sedimentation test is 7 mm in one hour. There are no other complaints or abnormal physical findings. What would be your advice to this patient?

(5) Discuss briefly the difference between primary and secondary tuberculosis from a pathological, diagnostic and therapeutic standpoint.

### *Thoracic Diseases (Surgical Aspects)*

(Answer No. 1, and any 2 of the following questions)

- (1) How do you manage a case of tuberculous empyema complicated by bronchopleural fistula?
- (2) Discuss primary carcinoma of the lung from
  - (a) the standpoint of suggestive or presumptive signs,
  - (b) positive evidence,
  - (c) how would you obtain positive evidence?
- (3) Discuss spontaneous pneumothorax including the diagnosis and management.
- (4) Discuss the relative merit of the various permanent forms of collapse therapy
  - (a) what are your indications for thorocoplasty?
  - (b) what are your contraindications for a thorocoplasty?
- (5) Discuss the indications for resection in pulmonary tuberculosis.

### *Bacteriology and Immunology*

(Answer question 1 and 2, and one of the following three questions)

- (1) Discuss briefly the characteristics of the tubercle bacillus. Give the different types and their relation to human tuberculosis. What are the ordinary means by which the different types of this bacillus are distinguished?
- (2) List fungus disease that may involve the lung and briefly describe fungi involved.
- (3) Give currently employed typing procedure for pneumococci. Which types are most commonly recovered from cases of lobar pneumonia?
- (4) List in order of their frequency the organisms found responsible for cases of bronchopneumonia.
- (5) List the more common non-tuberculous chronic diseases of the lungs (five or six) in which the presence or absence of specific organisms is important in differential diagnosis. Briefly outline differential diagnosis of each of these from pulmonary tuberculosis.

### *Pathology*

(Answer any three of the following five questions)

- (1) Name the pneumoconioses and describe the findings in the three most important dust diseases.
- (2) Describe briefly the chain of pathological events involved in the spread of tubercle bacilli from an active focus in the lung to other parts of the same lung, to the other lung or to other parts of the body.
- (3) Give the pathogenesis of lung abscess.
- (4) List the tumors which may arise in the mediastinum.
- (5) Describe briefly the different pathological processes that may take place as active tuberculous foci in the lungs retrogress and eventually become inactive.

### *Physiology*

(Answer any two of the following five questions)

- (1) Define and discuss vital capacity. How is vital capacity determined, and why is it important in the treatment of tuberculosis?
- (2) How would you advise as to possible bad effects that may be encountered in each of the following patients who is contemplating an airplane trip during which travel may be at an altitude of 10,000 feet?
  - (a) An active case of pulmonary tuberculosis.
  - (b) An arrested case of pulmonary tuberculosis, particularly if there is fairly extensive fibrosis.

- (c) A patient with unilateral artificial pneumothorax  
(d) A patient who has had a seven rib extrapleural thorocoplasty  
Give briefly the reasons for your advice in each case  
(3) Would oxygen therapy be indicated or not in the presence of chronic cyanosis? Explain  
(4) What are the current views relative to the mechanism of precipitation of atelectasis?  
(5) What are the possible physiological explanations of the characteristic fever associated with multiple small pulmonary emboli?

### *Anatomy of the Chest*

(Answer any two of the following three questions)

- (1) Discuss the blood supply of the lungs and state practical applications attendant thereto  
(2) Discuss surface anatomy of the various lobes and fissures of the lungs  
(3) Discuss the lymphatic system of the thoracic cage

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## COUNCILS AND COMMITTEES

New members have been appointed to many of the College councils and committees to replace those whose terms of service have expired. We are pleased to list below the present membership of some of the councils and committees

### Council on Undergraduate Medical Education

E W Hayes, M.D., Monrovia, California, Chairman  
Andrew L Banyai, M.D., Milwaukee, Wisconsin  
Benjamin L Brock, M.D., Oteen, North Carolina  
Louis L Friedman, M.D., Birmingham, Alabama  
Sydney Jacobs, M.D., New Orleans, Louisiana  
C Howard Marcy, M.D., Pittsburgh, Pennsylvania  
Elliott Mendenhall, M.D., Dallas, Texas  
Nelson W Strohm, M.D., Buffalo, New York

### Council on Postgraduate Medical Education

J Winthrop Peabody, M.D., Washington, D C, Chairman  
Seymour M Farber, M.D., San Francisco, California  
Frank R Ferlino, M.D., New York, New York  
Alvis E Greer, M.D., Houston, Texas  
Chevalier L Jackson, M.D., Philadelphia, Pennsylvania  
I L Robbins, M.D., New Orleans, Louisiana  
Moses J Stone, M.D., Boston, Massachusetts  
Willard Van Hazel, M.D., Chicago, Illinois  
W Bernard Yegge, M.D., Denver, Colorado

### Council of Medical Directors and Superintendents of Tuberculosis Hospitals and Sanatoria

Benjamin L Brock, M.D., Oteen, North Carolina, Chairman  
Russell S Anderson, M.D., Erie, Pennsylvania  
John B Andosca, M.D., Mattapan, Massachusetts  
Merle D Bonner, M.D., Jamestown, North Carolina  
E F Conlogue, M.D., Dayton, Ohio  
M A Cunningham, M.D., Beaumont, Texas  
Stephen A. Douglass, M.D., Paterson, New Jersey  
David F Loewen, M.D., Decatur, Illinois  
Harry C Warren, M.D., San Francisco, California



## Sub-Committee on Sanatorium Standards

I D Bobrowitz, M.D, Otisville, New York, Chairman  
 Russell S Anderson, M.D, Erie, Pennsylvania  
 Philip H Narodick M.D, Seattle, Washington  
 Arnold Shamaskin, M.D, Hines, Illinois  
 Charles F Taylor, M.D, Norton, Kansas  
 B H Wardrip, M.D, San Jose, California

## Sub-Committee on Rehabilitation

Allan Hurst, M.D, Denver, Colorado, Chairman  
 E F Conlogue, M D, Dayton, Ohio  
 Myron Herman, M.D, New York, New York  
 Herman E Hilleboe, M.D, Washington, D C  
 C Gerald Scarborough, M.D, San Jose, California  
 Arthur S Webb, M.D, Glen Ellyn, Illinois

## National Council of Tuberculosis Committees

James H Stygall, M D, Indianapolis, Indiana, Chairman  
 James F Brewer, M.D, New Bedford, Massachusetts  
 Maurice Campagna, M.D, New Orleans, Louisiana  
 Cole B Gibson, M.D, Meriden, Connecticut  
 D W Heusinkveld, M D, Cincinnati, Ohio  
 John S Packard, M.D, Allenwood, Pennsylvania  
 Rufus A Schneiders, M.D, San Diego, California  
 Nelson W Strohm, M D, Buffalo, New York  
 Darrell H Trumpe, Springfield, Illinois

## Council on Pan Pacific Affairs

Harry C Warren, M.D, San Francisco, California, Chairman  
 Capt Robert E Duncan, M C, U.S.N, Hawaiian Islands, Vice-Chmn  
 Indubhusan Basu, M D, Calcutta, India  
 John S Bouslog, M.D, Denver, Colorado  
 Miguel Canizares, M D, Quezon City, Philippine Islands  
 A Barklie Coulter, M.D, Washington, D C  
 John Bell Ferguson, M.D, Melbourne, Australia  
 W Elliott Harrison, M.D, Vancouver, British Columbia  
 Paul H Hollinger, M D, Chicago, Illinois  
 A Holmes Johnson, M.D, Kodiak, Alaska  
 Maj Gen S U Marietta, Washington, D C  
 J Ancheng Miao, M.D, Kunming, China  
 George G Ornstein, M D, New York, New York  
 Richard H Overholt, M.D, Brookline, Massachusetts  
 Lincoln Pan, M.D, Shaoshing, China  
 Li Shu Fan, M.D, Hong Kong, China

## Board of Examiners

Alvis E Greer M.D Houston, Texas, Chairman  
 Edward W Hayes, Monrovia, California  
 Alton Ochsner, M.D, New Orleans, Louisiana

## Council on Public Health

Paul A Turner, M.D, Louisville, Kentucky, Chairman  
 Sidney A Britten, Comdr, M C, U.S.N, Washington, D C  
 Richard Davison, M.D, Chicago, Illinois

John B Grow, Col , M C , Denver, Colorado  
W H Hatfield, M.D , Vancouver, British Columbia  
Herman E Hilleboe, M.D , Washington, D C  
Samuel E Thompson, M.D , Kerrville, Texas  
Walter E Vest, M.D , Huntington, West Virginia  
Roy A Wolford, M.D , Washington, D C

Council on Public Relations

John Roberts Phillips, M.D , Houston, Texas Chairman  
Grant Thorburn, M.D New York N Y , Vice-Chairman  
R B Homan, M.D , El Paso, Texas  
Everett Morris, M.D , Olive View, California  
J Karl Poppe, M.D , Portland, Oregon

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The Milwaukee Metropolitan Section of the American College of Chest Physicians held an Informal dinner meeting at the Medford Hotel on Friday, November 29th Dr Stanley Szymanski presented the subject "Pneumoperitoneum" There was a large attendance and a stimulating discussion

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Dr William A Hudson, F C C.P , Detroit, Michigan, was recently appointed by Dr Charles M Hendricks, President, to serve as Historian of the American College of Chest Physicians

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Dr Enrique Coronado Iturbide, F C C.P , Guatemala City, has been appointed to serve as Governor of the College for Guatemala

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Dr Carlos Gonzales B , F C C.P , San Salvador, has accepted appointment to serve as Governor of the College for El Salvador

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DR HERMAN E HILLEBOE APPOINTED TO  
SUCCEED DR LEWIS R THOMPSON

After 36 years of distinguished service in the United States Public Health Service, Dr Lewis Ryers Thompson, Assistant Surgeon General in the Bureau of State Services was retired for medical disability on November 1st Dr Thompson's resignation brings to a close a brilliant record in the history of the United States Public Health Service Dr Thompson joined the Public Health Service as an Assistant Surgeon in 1910 He served in all the ranks of the service and was appointed Assistant Surgeon General in 1930, a position which he held for 16 years Since 1943 he has served as Chief and Associate Chief of the Bureau of State Services in which capacity he supervised the activities of the States Relations Division, Venereal Disease Division, Industrial Hygiene Division, Tuberculosis Control Division, and Public Health Nursing

To fill the vacancy left by Dr Thompson, Dr Herman E Hilleboe, who has been Chief of the Tuberculosis Control Division since its in-

ception in 1944, has been appointed Associate Chief of the Bureau of State Services, with the rank of Assistant Surgeon General Dr Hilleboe has been engaged in public health work since 1933 and has specialized in tuberculosis control He was assigned by the Public Health Service to study tuberculosis control in England, the Scandinavian countries, Germany, and France He has served in many important capacities on special committees on tuberculosis here and abroad In his new position Dr Hilleboe will have supervisory responsibility for the Tuberculosis Control Division and the newly created Hospital Facilities Division In the latter capacity he will assist in the administration of the recently enacted Hospital Construction Act

Senior Surgeon Francis J Weber, formerly Assistant Chief of the Tuberculosis Control Division, has been promoted to the rank of Medical Director and will serve as Chief of the Tuberculosis Control Division Dr Weber has had extensive experience in public health work in Georgia, Louisiana, Michigan, and California He assisted in the establishment of the Tuberculosis Control Division and has served as Medical Officer in Charge of the State Aid Section of the Division since 1944 In this position Dr Weber administered grant-in-aid funds distributed to the States by the Tuberculosis Control Division

#### VETERANS ADMINISTRATION BRANCH SECTION CHIEFS IN THORACIC SURGERY

	<i>Branch</i>
Dr Gustaf Lindskog _____ Yale University Medical School, New Haven, Connecticut	No 1
Dr Warriner Woodruff _____ 8 Church Street, Saranac Lake, New York	No 2
Dr Edward M Kent _____ University Club, Pittsburgh, Pennsylvania	No 3
Dr Everett Drash _____ University of Virginia Hospital, Charlottesville, Virginia	No 4
Dr Edward F Parker Jr _____ 70 Hasell Street, Charleston, South Carolina	No 5
Dr William M Tuttle _____ 307 David Whitney Building, Detroit, Michigan	No 6
Dr Joseph Gale _____ University of Wisconsin, Madison, Wisconsin	No 7
Dr O T Clagett _____ Mayo Clinic, Rochester, Minnesota	No 8
Dr Thomas Burford _____ Department of Surgery, Barnes Hospital, St Louis 10, Missouri	No 9
Dr Michael DeBakey _____ Tulane Medical School, New Orleans, Louisiana	No 10
Dr Oscar C Procter _____ Medical Dental Building, Seattle, Washington	No 11
Dr Paul Samson _____ 2938 McClure, Oakland, California	No 12
Colonel John B Grow _____ Fitzsimons General Hospital, Denver, Colorado	No 13

## ANNOUNCEMENT

The Scientific Program Committee, American College of Chest Physicians, will be pleased to receive manuscripts or abstracts for approval by the committee in connection with the 13th Annual Meeting of the College to be held in Atlantic City in June 1947. Please address all communications to the Chairman of the Committee

Andrew L. Banyai, M.D., Chairman, Scientific Program Committee  
Muirdale Sanatorium, Milwaukee 13, Wisconsin

Burgess Gordon, M.D.  
Philadelphia, Pennsylvania

Minas Joannides, M.D.  
Chicago, Illinois

## ANNOUNCEMENT

Reprints of the "General Code Relating to the Control of Tuberculosis by Modern Means" are available for distribution upon request at the Executive Offices of the American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois. This outline was prepared by the Committee on State Laws of the College and published in the September-October issue of "Diseases of the Chest"

MEMBERS OF THE COLLEGE RELEASED FROM  
THE ARMED SERVICES

Albertson, L. C., Lt. Comdr, MC, Veterans Hospital, Outwood, Kentucky  
Alley, Ralph Martin, Major, MC, Indiana Sanatorium, 801 North Vassar, Albuquerque, New Mexico  
Amazon, Peter, Capt, MC, 1040 Sterling Place, Brooklyn, New York  
Bachman, Henry, 1st Lt, MC, 157 North Union, Delaware, Ohio  
Baker, Robert Henry, Lt. Comdr, MC, Belmont Hospital, Worcester, Mass.  
Banquer, Jacob Ellis, Colonel, MC, 598 Washington St., Brookline, Mass.  
Bartholomew, Jack D., Major, MC, 701 Seventh Street, Boulder, Colorado  
Bass, Hyman E., Bapt, MC, 266 West End Avenue, New York, New York  
Beloff, Harry, Capt, MC, 844 Ritner St., Philadelphia, Pennsylvania  
Beloff, Lewis, Capt, MC, 844 Ritner St., Philadelphia, Pennsylvania  
Blades, Brian B., Lt. Col., MC, 1335 "H" Street, Washington, D. C.  
Bloomberg, Allan E., Capt, MC, 214 W. 72nd St., New York 23, New York  
Blum, Milton, Capt, MC, 310 Stigman Parkway, Jersey City, New Jersey  
Bornstein, Paul K., Major, MC, 320 Asbury Ave., Asbury Park, New Jersey  
Bridge, Frederick D., Capt, MC, 205 Avenue "P", Brooklyn, New York  
Brotman, David M., Lt., MC, USNR, 5632 Sheridan Road, Chicago, Illinois  
Bruhl, Charles K., Capt, MC, 1706 North Blvd., Houston, Texas  
Bugden, Walter F., Capt, MC, 677 W. Onondago St., Syracuse, New York  
Castle, Charles A., Lt. Comdr, MC, Dunham Hospital, Cincinnati 15, Ohio  
Chandler, John H., Major, MC, 706 S. Mansfield, Memphis, Tennessee  
Cabb, Norman E., Lt. Comdr, MC, Colais, Maine  
Cohen, Samuel C., Lt., MC, 416 Marlborough St., Boston, Massachusetts  
Combs, Stuart Richardson, Capt, MC, 2620 N. 10th St., Terre Haute, Ind.  
Dalley, J. Emerson, Lt. Comdr, MC, 3614 Tangley St., Houston 5, Texas  
Davis, John Dwight, Lt. Col., MC, 1930 Wilshire Blvd., Los Angeles 5, Cal.  
Davis, Paul Vincent, Major, MC, 94 Main Street, Bridgton, Maine

- Deason, Lloyd D , Lt Comdr, MC, 301 Rogers St , Henderson, Texas  
 Dimsdale, Lewis J , Capt, MC, 431-34 Frances Bldg , Sioux City, Iowa  
 Domm, Sheldon E , Lt USNR, MC, 529 E Chicago Ave , Neperville, Illinois  
 Drozda, Joseph P , Lt Col , MC, 510 Redick Tower Bldg , Omaha, Neb  
 Dundee, John C , Capt , MC, Veterans Hospital, Waukisha, Wisconsin  
 Eckstein, Albert, Major, MC, 1514 N 10th Street, Phoenix, Arizona  
 Evans, George Francis, Major, MC, 206 N Chestnut St, Clarksburg, W Vir  
 Feinberg, Abraham, Lt Comdr USNR, MC, 5860 Kenmore Chicago, Ill  
 Felts, Clifton, Capt MC, 1011 Roosevelt, Seminole, Oklahoma  
 Felson, Henry, Capt , MC, 732 Greenwood Avenue, Cincinnati, Ohio  
 Fisher, Martin M , 1st Lt , MC, 45 Linden Blvd , Brooklyn, New York  
 Flattery, James F , Capt, MC, 575 W 172nd St , New York 32, New York  
 Frost, Russell Harold, Comdr , MC, Veterans Administration, Midland  
 Bank Building, Minneapolis, Minnesota  
 Galinsky, Leon J , Capt, MC, Broadlawns Polk Company Hospital, 18th  
 and Hickman Road, Des Moines, Iowa  
 Gibbons, Morton R Jr , Comdr USNR, MC, 3979 Washington Street, San  
 Francisco 18, California  
 Gloeckler, Bernhard B , Capt , MC, Mt Pleasant, Iowa  
 Goldman, Alfred, Lt Comdr, MC, 516 Sutter St , San Francisco, Calif  
 Goliger, J J , Lt , MC, 3506 Newkirk Avenue, Brooklyn, New York  
 Gompertz, John L , Major, MC, No 1 Hacienda Road, Orinda, California  
 Gorfinkel, Leon H , Comdr , MC, 18225 Beverly Glen Boulevard, Los  
 Angeles 28, California  
 Gorlin, David O , Major, MC, 130-01 Lefferts Boulevard, South Ozone  
 Park, Queens, New York  
 Gorlin, Philip Samuel, Capt , MC, 130-01 Lefferts Boulevard, South  
 Ozone Park, Queens, New York  
 Gould, Arthur A , Major, MC, 1215 Ocean Avenue, Santa Monica, Calif  
 Greco, Edward A , Major, MC, 12 Pine Street Portland, Maine  
 Grund, Joseph, Capt , MC, 7 Low Street, Liberty, New York  
 Guzman, Manuel Jr , Major, MC, Santurce, Porto Rico  
 Hall, Snowden C Jr , Lt Comdr , MC, Hawthorne Drive, Forest Hills,  
 Daneville, Virginia  
 Hanna, Roger J , Lt Col , MC, 1301 Washington Ave , Jackson, Michigan  
 Hardie, Philip W , Lt Col , MC, 229 Herkimer St , Hamilton, Ontario  
 Harris, Marvin Saul, Capt , MC, 2007 Wilshire Blvd , Los Angeles, Calif  
 Harrison, David A , Capt , MC, Broadacres Sanatorium, Utica, New York  
 Heinrich, J Fuhrman, Lt Comdr , MC, 43-55 Kissens Blvd , Flushing, N Y  
 Hellweg, Charles Edward, Major, MC, Pierce City, Missouri  
 Henry, Russell Seldon, Lt Comdr , MC, 1019 Hume Mansur Building,  
 Indianapolis, Indiana  
 Hill, Vivian D , Major, MC, 118 South Street, Mobile, Alabama  
 Hudson, William E , Capt , MC, 131 Fair Ave , N E , New Philadelphia, O  
 Hughes, S Edwin, Comdr USNR, MC, U S Veterans Hospital, Oteen,  
 North Carolina  
 Idstrom, Linneus G , Lt Col , MC, Care Dr I G Idstrom, Minnesota  
 State Sanatorium, Walker, Minnesota  
 Ingegno, Alfred P , Major, MC, 880 Carrol Street, Brooklyn, New York  
 Jones, John Ben, Lt USNR, MC, 115 N Gex St , La Plata, Missouri  
 Kellogg, Howard B , Lt Col , MC, 2001 24th Ave , N Seattle, Washington  
 Kent, Edward M , Comdr , MC, Allegheny Gen Hospital, Pittsburgh, Pa  
 Kincov, Jacob, Major, MC, 243 Spring Garden St , Easton, Pennsylvania

- King, Richard, Capt, MC, 261 Alberta Drive N E, Atlanta, Georgia  
 Kirshner, Jacob Jesse, Capt, MC, 2025 Spruce St, Philadelphia 3 Pa  
 Klein, William S, Capt, MC 4424-A Drexel Blvd, Chicago, Illinois  
 Klupt, Robert Louis, Major, MC, 5 East 76th St New York 21, New York  
 Knles, Philllp T, Lt Col, MC, 463 E Town Etreet, Columbus 4, Ohio  
 Knoepp, Louis F, Lt Col, MC, 5900 Line Ave Shreveport Louisiana  
 Konterwitz, Harry, Major, MC, 41-22 42nd St Sunnyside, Long Island  
 Lande, Frank, Major, MC, Rocky Glen Sanatorlum, McConnelsville, Ohio  
 Larson, Swen Leonard, Major, MC 213 Columbia St Elmira, New York  
 Lederer, Francis L Lt Comdr MC, 307 N Michigan Ave Chicago, Ill  
 Lichtenberg, Walter, Capt, MC, 116 Central Park South, New York N Y  
 Lipstein, Samuel Capt, MC, Workmen's Circle San Liberty New York  
 Lovgren, Robert Ellsworth, Capt, MC, McMillan Hospital 600 S Kings-  
 highway, St Louis, Missouri  
 Madding Gordon F, Major, MC, 111 E Harris Ave San Angelo, Texas  
 Marcus, David, Capt, MC, 1285 Addlson Road Cleveland 3, Ohio  
 Mayo Leroy E Capt, MC, Holden Clinic, Holden Massachusetts  
 McDaniel, Walter Shaw, Lt Comdr, MC 2231 Southgate, Houston Texas  
 Mehmert, Henry Eugene Major, MC, Oleng, Illinois  
 Melles, Chester J, Lt Col, MC, Care Stalleup Bldg, Slkiston Missouri  
 Milanesi Armand M, Major, MC, 2 Potter Place Weehawken New Jersey  
 Miller, Morell Waldo, Lt Comdr, MC, 332 Audobon Bldg, New Orleans La  
 Miller, Raymond Everett Lt, MC, 192 W State Street, Trenton, N J  
 Minnis, Dean Hugh, Capt, MC, Pleasant View Sanitarium Amherst Ohio  
 Morris, Stanley F, Lt, MC, 246 Roswell St Long Beach 3, California  
 Mosler, Dwight J, Capt, MC, 307 W Midland St, Bay City Michigan  
 Myers, Dan Wilbur Lt Col, MC 323 Michigan Central Terminal Detroit  
 16, Michigan  
 Narodick, Phillip Howard, Major, MC, 2229 22nd Ave North Seattle Wash  
 Nathan, David A, Major, MC, 605 Lincoln Road, Miami Beach, Florida  
 Nimitz, Herman J, Lt Col, MC, Hamilton County Tuberculosis Hospital,  
 Cincinnati Ohio  
 O'Hara, Francis Paul, Comdr USNR, MC, 233 "A" St San Diego, Calif  
 O'Malley, James E, Capt MC, Anchorage, Alaska  
 Passalacqua Luis A, Lt Col, MC, 15 Travieso St Santurce, Puerto Rico  
 Pau, Jaime F, Capt, MC, Box 18, Hato Rey, Puerto Rico  
 Paul, S Barre, Lt Comdr, MC, 450 Sutter St, San Francisco California  
 Platt, Arnold D, Capt, MC, 44 East Church Street Columbus, Ohio  
 Placak Joseph Charles Jr, Comdr, MC 10515 Carnegie Ave Cleveland  
 6, Ohio  
 Plumer, Joseph Nellson, Capt, MC, Chief of Medical Service Veterans  
 Administration Hospital, Tucson, Arizona  
 Price, Henkel Moser, Capt, MC, 205 Union Street Wytheville, Virginia  
 Reiss, Jack, Capt, MC, Veterans Administration, Indianapolis, Indiana  
 Reyes, Felix M, Capt, MC, Bayamon District Hospital, Bayamon P R  
 Robbins, Eric Patterson, Major, MC, Brookhaven, Massachusetts  
 Rogers Galen Alonzo, Major, MC, 718 Sycamore Street, Clarkston Wash  
 Rogoff, Jacob Lt Comdr, MC, 25 Eastern Parkway, Brooklyn, New York  
 Rosenbaum, Joseph George, Capt, MC, North Royalton, Ohio (P O  
 Brecksville)  
 Rothermich Norman O Capt, MC 370 East Town St, Columbus, Ohio  
 Rouff, Elliot Arnold, Lt Comdr, MC, 1930 Wilshire Blvd, Los Angeles, Cal  
 Rutherford, Findlay D, Major, MC, 1315 Emory St, San Jose 11, Cal

- Ryan, Raymond Charles, Capt, MC, 87-26 175th St, Jamaica 3, New York  
Samson, Paul Curkeet, Major, MC, 805 Highland Ave, Piedmont, Cal  
Schall, James A, Capt, MC, 5125 Leona Drive, Cincinnati, Ohio  
Schell, Robert E, Capt, MC, Bowling Green, Kentucky  
Schneble, Richard C, Lt Comdr, MC, 401 Greenmount Blvd, Dayton 9, O  
Schock, H Charles, Major, MC, 10515 Carnegie Ave, Cleveland 6, Ohio  
Schwartz, Benjamin, Capt, MC, Veterans Administration Facility, 130 W  
Kingsbridge, Bronx, New York  
Schwartzman, Joel J, Capt, MC, 5410 Netherland Ave, Bronx 63, N Y  
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Long Island, New York  
Selman, Morris, Capt, MC, 2605 Fulton Street, Toledo, Ohio  
Shapiro, David, Capt, MC, 30 West 29th Street, Bayonne, New Jersey  
Shipp, David Harvey, Lt Comdr, MC, 443 Donaghey Building, Little  
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Sims, John Arthur, Lt Col, MC, 480 Lowell Ave, Newtonville, Mass  
Sokol, Louis Irwin, Major, MC, 984 Third Ave, Los Angeles 8, California  
Spalding, William C, Lt Col, MC, 947 W 8th St, Los Angeles, California  
Stacey, John Wallace, Capt, MC, 1930 Wilshire Blvd, Los Angeles, Cal  
Staff, Robert A, Major, MC, Indiana State Sanatorium, Rockville, Ind  
Steen, William B, Major, MC, 110 South Scott St, Tucson, Arizona  
Steinberg, Israel, Lt Comdr, MC, 15 W 81st St, New York, New York  
Stork, Walter J, Capt, MC, 3801 Fannin Street, Houston, Texas  
Stickler, Cyrus W Jr, Major, MC, 21 Brookhaven Drive, N E, Atlanta, Ga  
Swasey, Lloyd K, Lt Comdr, MC, 15 E Monroe St, Phoenix, Arizona  
Swett, Herbert C, Capt, MC, City Hospital, 1515 Lafayette Avenue, St  
Louis, Missouri  
Taymor, Joseph, Lt Comdr, MC, 6777 Clyde Ave, Chicago 49, Illinois  
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Thomas, Efton J, Capt, MC, 835 Lincoln Road, Miami Beach, Florida  
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Tsoulos, George D, Capt, MC, 10 N Clark St, Chicago, Illinois  
Van Der Schouw, Harold Mundell, Capt, MC, Lutheran Sanatorium,  
Wheat Ridge, Colorado  
Walters, Henry W, Colonel, MC, Sunmount, New York  
Ward, James A, Comdr, MC, 210 E 8th St, Metropolis, Illinois  
Weinberger, Emanuel M, Major, MC, 255 S 17th St, Philadelphia, Pa  
Werner, Aaron A, 1st Lt, MC, 2084 61st St, Brooklyn, New York  
Weissman, Herman, Capt, MC, Veterans Administration Facility, Legion,  
Texas  
Wheeler, Daniel Wilbur, Capt, MC, 717 Medical Arts Building, 324 West  
Superior Street, Duluth, Minnesota  
Wilen, Carl John, Major, MC, Nelson Clinic, Manhattan, Kansas  
Witt, Joseph J, Lt Comdr, MC, 258 Genesee St, Utica, New York  
Wright, Fletcher J, Major, MC, 1617 Blair Road, Petersburg, Virginia  
Yntema, Stuart, Lt Col, MC, 333 S Jefferson Ave, Saginaw, Michigan  
Zelman, Julius, Major, MC, 1533 Mt View, San Bernardino, California

## Obituaries

### JOHN S AGAR JR

1909 - 1946

Dr John S Agar Jr of Little Rock, Arkansas, died suddenly of coronary occlusion on October 15, 1946

Dr Agar received his pre-medical education at Washington University, St Louis, Missouri He was graduated from the Arkansas School of Medicine His rotating internship was served at the Jewish Hospital, St Louis, Missouri He served his Assistant Residency in Otology, Laryngology and Rhinology at Barnes Hospital, St Louis, Missouri During World War II he served in the Navy He was attached to the 2nd Marine Division and received a personal citation for bravery

He was a member of the American College of Chest Physicians, the Arkansas Medical Society, and Pulaski County Medical Society

J D Riley, M.D

Governor for Arkansas

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### CLYDE M. FISH

1875 - 1946

With deep sorrow but humbly submitting to the will of God we report the death of Dr Clyde M Fish which occurred on November 21st as a result of cerebral accident

Dr Fish was a valued member of the New Jersey Chapter of the College, of which he was President in 1944 He was born in Bath, Pennsylvania in 1875 and was educated at Lehigh University, Rush Medical College and the Jefferson Medical College from which he graduated in 1900 In 1901 he was appointed to the staff of the Atlantic City, New Jersey Hospital and in 1916 was made Medical Director of the Atlantic City Hospital for Chest Diseases which position he held until his death He was for many years a Director of the New Jersey Tuberculosis League

Martin H Collier, M.D

Governor for New Jersey

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### ANNOUNCEMENT

May 1st 1947 is the deadline for entering the \$34,000 prize art contest on the special subject of "Courage and Devotion Beyond the Call of Duty" (on the part of physicians in war and in peace) This contest is open to all M D's in the Western Hemisphere The exhibition will take place in conjunction with the A M A. Centennial Session at Atlantic City, June 9-13th, 1947 For complete information, write or wire now to Francis H Redewill, M.D., Secretary, American Physicians Art Association, Flood Building, San Francisco, California, or to the sponsor, Mead Johnson & Company, Evansville 21, Indiana, U.S.A



## Positions Wanted and Available

### MEDICAL SERVICE BUREAU

In accordance with a resolution adopted by the Board of Regents of the College at their annual meeting held in Chicago on June 17, 1945, a Medical Service Bureau has been established at the Executive Offices of the College for the purpose of serving the members of the College being released from the armed forces

The Bureau would appreciate receiving information from the medical superintendents of sanatoria regarding positions available at their institutions, together with full particulars as to the type of position and salary offered. Fellows of the College who are looking for assistants should send complete information to the Bureau.

Physicians being released from the armed forces who are seeking appointments and positions should send complete information to the Bureau regarding their training and the type of position desired.

Please direct all correspondence to the Medical Service Bureau, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois

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### POSITIONS AVAILABLE

Assistant physician wanted in tuberculosis hospital in southeast Texas. Three thousand a year with complete maintenance to single man. Excellent opportunity to learn chest surgery and other collapse therapy. Good climate the year around. For further information please write Box 148A, American College of Chest Physicians 500 N Dearborn Street, Chicago 10 Illinois

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Staff physician wanted at approved hospital complete medical and surgical service, out-patient facilities tuberculosis and other chest diseases. For further information please write Box 149A, American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

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Single doctor wanted as resident physician in tuberculosis sanatorium. For further information please write Box 151A American College of Chest Physicians 500 N Dearborn St, Chicago 10, Illinois

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Resident physician wanted at approved tuberculosis sanatorium for the

training of residents in tuberculosis. Salary offered will depend on the experience and qualifications of applicant. Applicants should give their training experience age etc in their first letter and if possible enclose a photograph. Please address Box 152A, American College of Chest Physicians, 500 North Dearborn St, Chicago 10 Illinois.

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Physician wanted for medical staff of the State Tuberculosis Sanatorium, Marianna, Florida, opened September 2 1946, with 200 bed capacity. The salary is \$300.00 or more depending upon experience with full maintenance for self and family. Please address Dr W D Rosborough, Superintendent and Medical Director of the sanatorium

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### POSITIONS WANTED

Fellow of the College, with 15 years full time hospital and sanatorium experience in tuberculosis and chest diseases desires Medical Directorship in progressive institution with good clinical opportunities. For additional information please address Box 232A, American College of Chest Physicians, 500 North Dearborn St, Chicago 10, Illinois

# Life Membership

## AMERICAN COLLEGE OF CHEST PHYSICIANS

In view of the increase in annual dues from \$10 00 per year to \$15 00 per year, it is recommended that the Schedule of Life Membership Fees be revised to include this increase

THEREFORE, BE IT RESOLVED, that the Board of Regents of the American College of Chest Physicians, hereby approve the following revised Schedule of Life Membership Fees, to become effective immediately

### SCHEDULE OF LIFE MEMBERSHIP FEES

58 years	\$165 00	52 years	\$255 00	45 years	\$360 00
57 years	180 00	51 years	270 00	44 years	375 00
56 years	195 00	50 years	285 00	43 years	390 00
55 years	210 00	49 years	300 00	42 years	405 00
54 years	225 00	48 years	315 00	41 years	420 00
53 years	240 00	47 years	330 00	40 years	435 00
		46 years	345 00		

Minimum fee for Life Membership of Members having attained the age of 59 years or over will be \$150 00

The above figures have been estimated on a 69 year life expectancy

### A P P L I C A T I O N

#### AMERICAN COLLEGE OF CHEST PHYSICIANS

500 North Dearborn Street

Chicago 10, Illinois

I hereby subscribe to Life Membership in the *American College of Chest Physicians* According to the present plan, at my age the total Life Member-

ship Fee is (\$ \_\_\_\_\_ ) \_\_\_\_\_ Dollars

My annual dues shall cease at once I shall be entitled to the publications of the College, including the Directory and the Journal, *Diseases of the Chest*, without further cost, for the balance of my life, and my membership shall be permanently active

The principal of my subscription shall be added to the permanent Endowment Fund of the College

Name \_\_\_\_\_

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- "Twenty-Third Annual Report of the Macon County Tuberculosis Sanatorium," David F Loewen, M.D., Decatur Illinois
- "The Rehabilitation Program at The Municipal Sanatorium," I D Bobrowitz, M.D., and Joseph Newman, M.D., Otisville, New York.
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- "The Problems of Tuberculosis"—Reports on Tour of Canada and United States of America—(1) Administrative and Medical Section by Dr H. M. James, (2) Surgical Aspects of Tuberculosis in U.S.A. and Canada in 1945 by Mr C J Officer Brown.
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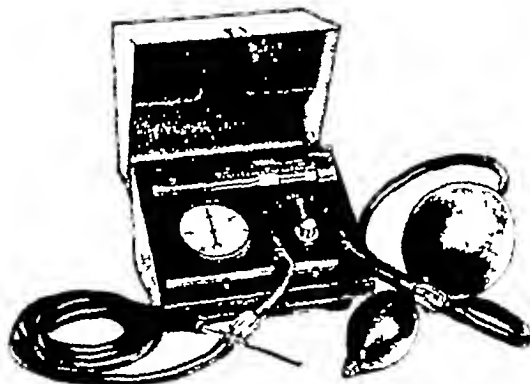
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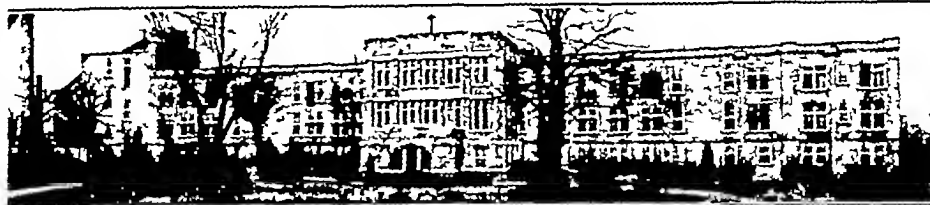
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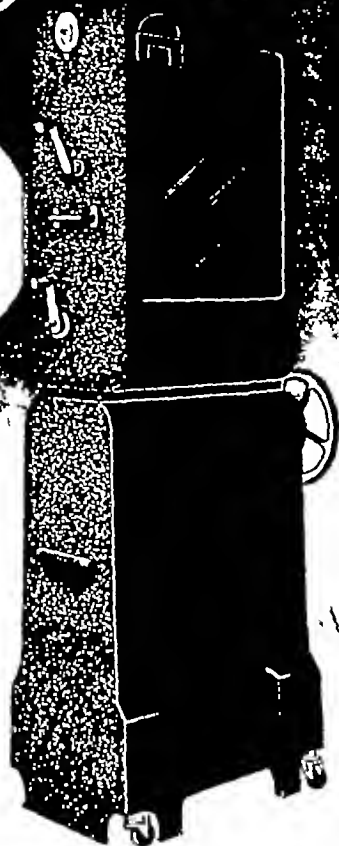
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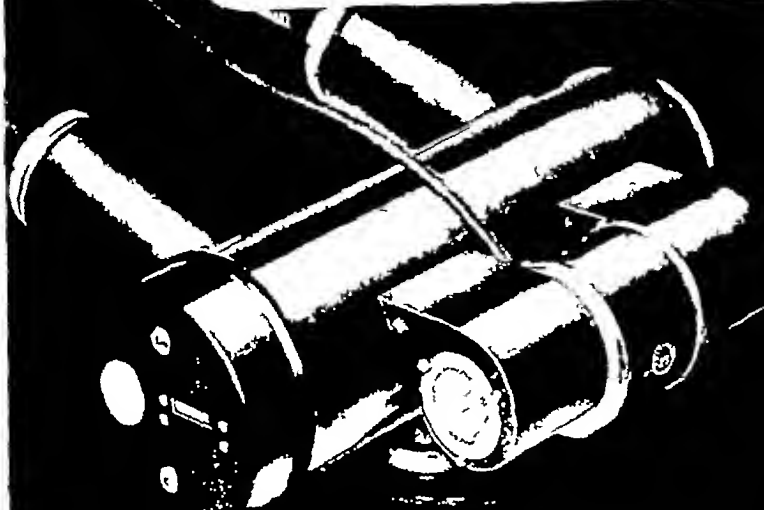
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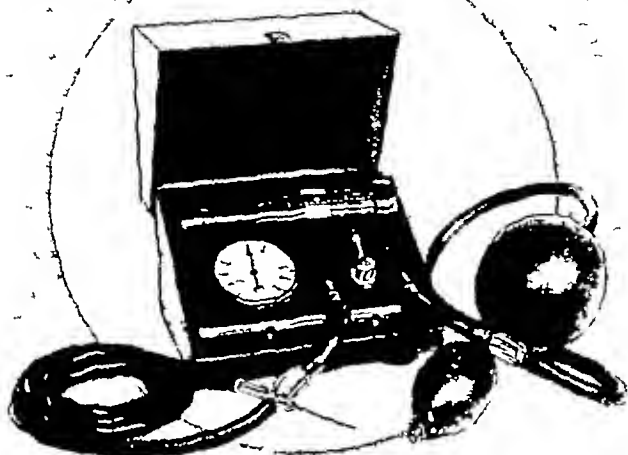
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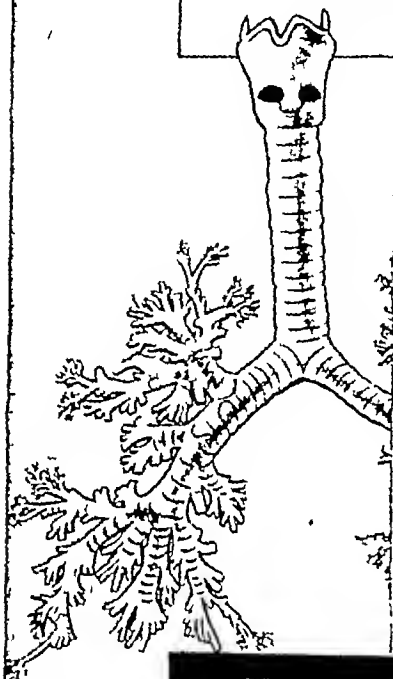
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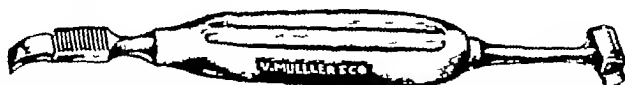
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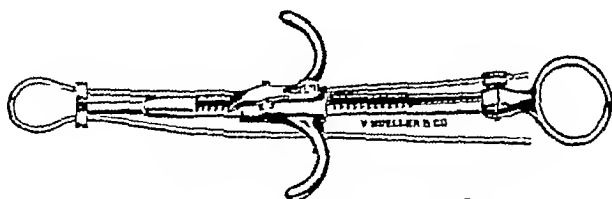
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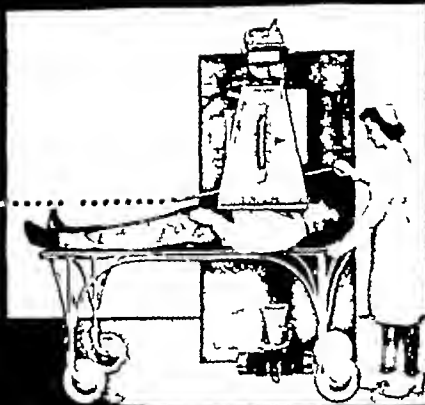
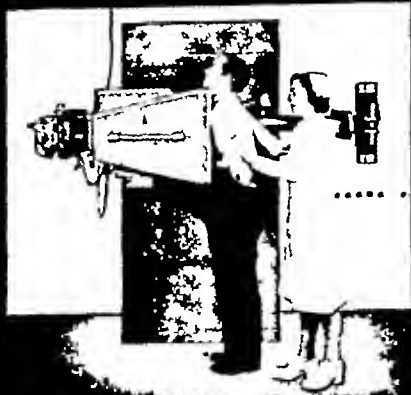
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# DISEASES *of the* CHEST

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## Multiple Segmental Resection in the Treatment of Bronchiectasis

RICHARD H OVERHOLT, M.D., F.C.C.P.,\*  
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Chest specialists now recognize that bronchiectasis is a disease which in most cases is best treated by surgery. Many reports, especially those of Perry and King,<sup>7</sup> and Bradshaw, Putney and Clerf,<sup>2</sup> have emphasized the seriousness of bronchiectasis untreated by excision. They have shown that on the average patients having symptoms since early childhood do not live much beyond the age of 30 and that life expectancy after the development of symptoms is only 13.5 years in the fatal cases. Bradshaw, et al.<sup>2</sup> further found that in the fatal cases the duration from diagnosis to death was only 1.8 years. This came as a surprise to many physicians, who, although they recognized that the patient with bronchiectasis had his "ups and downs," assumed that most of them went on for an indefinite time without very much change in their condition. An appreciation of the fallacy of this assumption has provided an impetus to the perfection of surgical treatment. Furthermore, the introduction of chemotherapy and the antibiotic drugs has increased rather than decreased the need for excisional therapy. Many patients who would have otherwise succumbed to acute exacerbations are now reconverted to the chronic form of the disease. The chest specialist, therefore, is faced with a problem of caring for more patients who live and suffer longer with the disease.

The changes that have taken place in the surgery of bronchiectasis during the past few years have been outstanding. There

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\*From the Department of Surgery, Tufts College Medical School, and the New England Deaconess Hospital, Boston, Massachusetts. Presented at the 13th Annual Meeting, American College of Chest Physicians, Atlantic City, New Jersey, June 6, 1947.

of disease processes has resulted. It has been generally appreciated for some time that pulmonary abscesses, for instance, are frequently situated in the upper posterior part of the lower lobe (superior segment) or in the anterior portion of the upper lobe (anterior segment). The explanation for this is obvious when one appreciates the anatomy of the segmental bronchi supplying these areas. When a patient is in the supine position, the superior divisional bronchus of the lower lobe is directly dependent. The same is true of the anterior segmental bronchus of the upper lobe with the patient in the lateral decubitus position. Thus material from the naso-pharynx or other segments of the lung will find its way into these dependent areas by gravity.

Bronchiectasis likewise shows a predilection for certain segments. Most frequently involved are the basal segments of the lower lobes, the left more often than the right.<sup>6</sup> Quite commonly

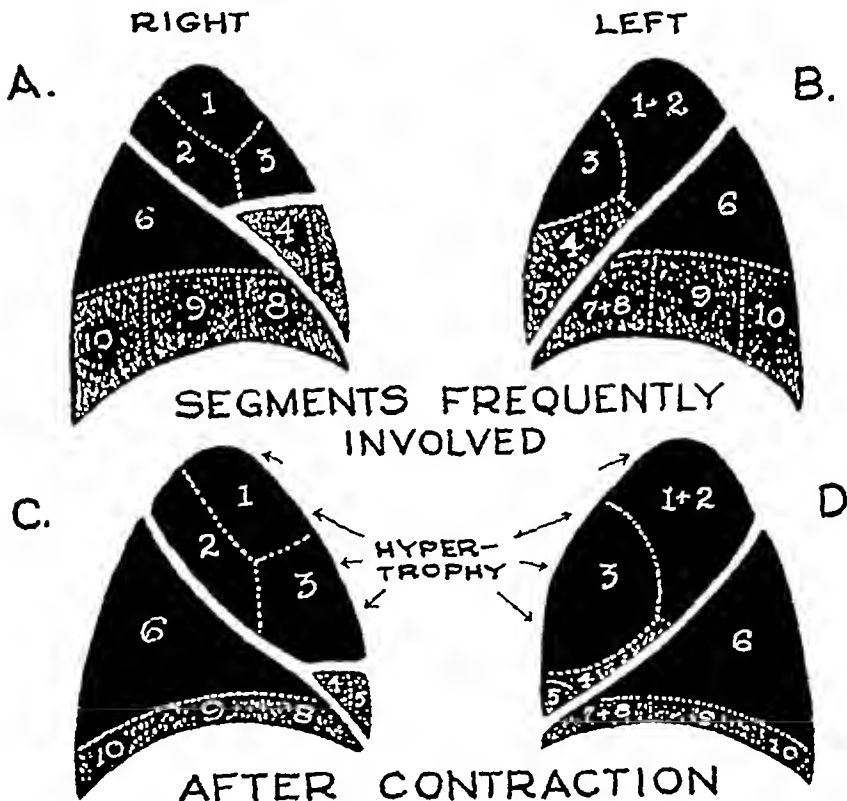


FIGURE 2 Diagrams of the lateral surface of the lungs with surface area of the segments outlined. The stippled areas of Diagrams "A" and "B" indicate those segments most frequently involved in bilateral bronchiectasis. Diagrams "C" and "D" show relative areas after the diseased segments have contracted and the healthy segments have enlarged. If the disease originated during the developmental period the enlargement of the healthy segments is accomplished by true growth or hypertrophy. If the volume change comes later in life, the uninvolved segments enlarge by simple over-expansion (emphysema).

the lingular portion of the left upper lobe is affected, occasionally by itself but usually in conjunction with the basal segment of the left lower lobe. On the right side the homologous areas are most generally involved, that is, the basal segment of the lower lobe and the middle lobe (Figure 2). Only rarely are other portions of the lung the seat of bronchiectatic changes except when associated with, or as sequelae of, preceding infectious processes. For instance, one occasionally sees bronchiectasis limited to the superior division of the lower lobe following a lung abscess in the same location.

The knowledge that bronchiectasis is usually segmental, rather than lobar, in its distribution stimulated our interest and that of others in the pulmonary segment as a possible unit of excision.

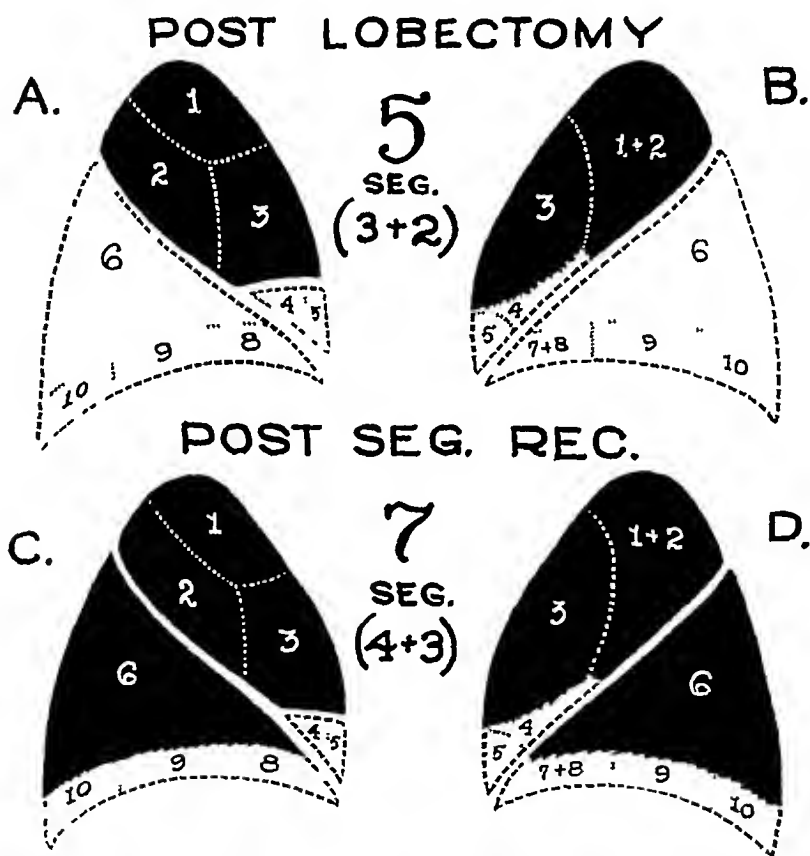


FIGURE 3 Diagrams of the lateral surface of the lungs with the segmental surface areas outlined. Diagrams 'A' and 'B' show small remaining areas if lobes are used as the units of excision in bilateral bronchiectasis. See Figure 2 for illustration of the most common distribution of bilateral disease. Diagrams 'C' and 'D' show relative areas conserved by using the segment as the unit of excision in bilateral disease.



Much credit should go to Churchill and Belsey,<sup>3</sup> to Blades,<sup>1</sup> and to Clagett and Deterling<sup>4</sup> for their concept of the problem and for their contributions in the development of the technique of segmental resection. One of the goals in excisional therapy is to eradicate all the disease without sacrificing any normal tissue. If this goal is to be approached in bronchiectasis, segments rather

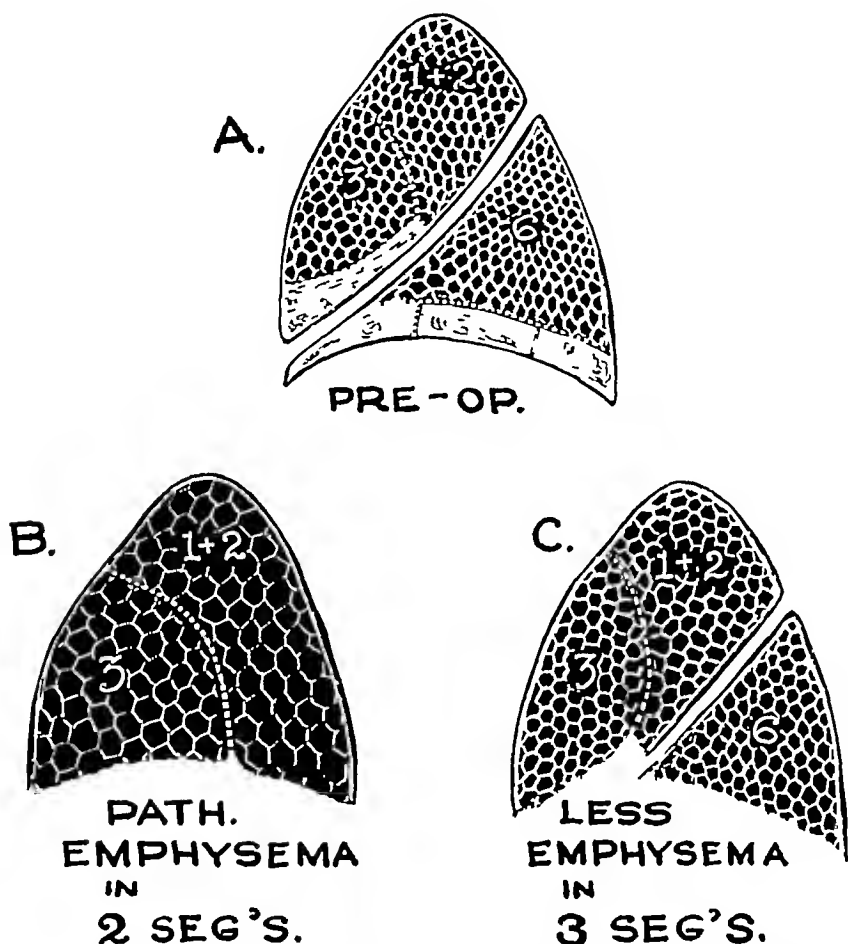


FIGURE 4 Diagrams of the lateral surface of the left lung illustrating the advantage of employing the segment rather than the lobe in bronchiectasis in adults. Diagram 'A' shows the relative size of the segments in a case of bronchiectasis of the lingular and basal segments. The three remaining healthy segments have hypertrophied because the patient developed bronchiectasis early in childhood. As the disease contracted the involved segments, the upper segments of each lobe grew to form abnormally large segments. If surgical treatment is carried out after puberty, any further expansion will take place by a process of simple over-stretching. Diagram 'B' shows the over-expansion of the remaining two segments if the entire lower lobe is removed together with the lingula. The resulting emphysema may be pathological. Diagram 'C' shows the lateral surface of the left lung after segmental resection for basal and lingular bronchiectasis. The previously hypertrophied superior segment of the lower lobe has been preserved. Its presence greatly lessens the need of the remaining two segments of the upper lobe of undergoing over-expansion.

than lobes become the excisional units for most cases. Furthermore, the conservation of all healthy pulmonary tissue becomes a necessity in treating many patients with extensive bilateral disease (Figures 3 and 4). The marked pulmonary insufficiency of the patient following removal of both lower lobes, the right middle lobe, and the lingula of the left upper may be just as incapacitating as the original disease itself.

### *Pre-operative Preparation*

There seems little doubt but that the use of the antibiotic penicillin pre-operatively has contributed to a safer, smoother postoperative course. Its use after operation is likewise important. Penicillin aerosol and/or penicillin intramuscularly effectively decreases the amount of expectoration and liquefies the material, thus permitting easier and more effective expectoration. These procedures, together with postural drainage, allow the patient to go through operation with a decreased hazard of postoperative atelectasis or pneumonitis from dissemination of the bronchial secretions.

### *Position During Operation*

The contralateral spill-over of secretions during operation has been recognized as a distinct hazard when the patient is operated upon in the side position. To obviate this risk the patient is placed in the face-down position. This new operative positioning has been employed for all types of intrathoracic surgery for the past three years.<sup>6</sup> With the patient suspended by the pelvis, shoulders, and face, the head can be kept lower than the remainder of the body, thus causing secretions to flow toward the patient's mouth without the tendency to contralateral contamination that occurs with the patient in the side position. This face-down position, although developed originally for resection in tuberculous cases, has been very beneficial for resection in cases of bronchiectasis because of the frequently large volume of bronchial secretion.

Patients in the prone position appear to withstand an open pneumothorax better than when lying on the side as the good lung is not encumbered by the weight of the heart and mediastinum, and there appears to be less tendency to mediastinal shift with respiration.

We also believe that the use of procaine anesthesia with endotracheal intubation under cocaine topical anesthesia, rather than the use of a general anesthetic, promotes a smoother convalescence and lessens postoperative pulmonary complications. The cough reflex is not completely inhibited during operation and becomes active immediately afterwards for the patient is conscious enough to cooperate.

### *Technique of Segmental Resection*

Each bronchopulmonary segment has its own bronchus, arterial blood supply, and venous return. Bronchus and artery penetrate through the hilum into the substance of the segments. The venous channels return along the surface of the segments. It is possible to apply the principles of individual ligation technique, as used in lobectomy and pneumonectomy, to the bronchopulmonary segments. After the artery, bronchus, and vein to a segment have been ligated and divided, it is then possible by gentle blunt dissection to separate the diseased from the normal segments. Before this separation is started, the normal segments are inflated by raising the intrabronchial pressure. The line of demarcation then stands out clearly and facilitates separation. The plane is comparatively avascular, and the actual splitting of the lobe is done by blunt dissection mainly by the thumb and forefinger. After the bronchus, artery, and vein to the segment have been divided, the only structure holding the segments together that needs to be separated by sharp dissection is the visceral pleura. This may be divided before the actual splitting of the lobe or afterward. We prefer to do this step last as it is occasionally difficult to accurately define the intersegmental pleural line until the segments are separated. The surface of the remaining segment may bubble slightly, but this usually stops after a moist cottonoid pad has been applied for a few moments. The use of clamps on the lung tissue is avoided and considered hazardous. It is impossible to place the clamps precisely in the intersegmental plane. Either too little or too much tissue will then be excised. No attempt is made to suture over the edges of the remaining segment as it has been found to be not only unnecessary but unwise. Suturing traumatizes the normal remaining tissue and reduces its volume.

### *Postoperative Care*

The after care of the patient following segmental resection is similar to that following a routine lobectomy. Attention is directed toward the maintenance of a free airway and re-expansion of the remaining pulmonary tissue. As a rule two intrapleural catheters are left in the chest—one posteriorly and one anteriorly—and both are connected to under-water drainage with moderate negative pressure of 4 to 8 centimeters of water. The drainage tubes are usually withdrawn 48 to 72 hours after operation provided there is roentgenographic evidence that the pleural space has become obliterated and the lung expanded. In some instances it is necessary for the tube to remain longer if there is still evidence of leakage of air from the pulmonary surface.

Oxygen is not ordinarily required postoperatively. It is felt that

in the absence of definite indication for its use, the deeper breathing that takes place in a normal atmosphere is advantageous in that it encourages more rapid re-expansion. Patients are urged to cough and raise voluntarily, and their position is changed frequently. Any evidence of retained secretions or atelectasis calls for prompt transnasal tracheo-bronchial aspiration or the more positive removal by bronchoscopy. An uneventful postoperative course is largely dependent on the maintenance of a free airway and prompt, complete pulmonary expansion.

### *Results*

The technique of segmental resection has been applied to all segments of all lobes for various conditions. This report, however, is limited to patients with bronchiectasis in whom segments of two or more lobes, or a lobe and one or more segments, were so removed. In the beginning segmental resection was employed only in patients with multi-segmental and bilateral disease. For the patient with unilobar involvement, lobectomy may still be preferable as conservation of all healthy pulmonary tissue is not as imperative.

In our series of patients with bronchiectasis, a total of 53 cases have been treated by one or more segmental resections. Inasmuch as we believe at present the procedure is primarily indicated in multilobar disease, this report has been confined to the 39 patients that have had multilobar resection.

Figure 5 shows the location of the various segments removed. We have found it usually more practical to remove all the basal segments of the lower lobes (3 on the left side and 4 on the right) as a single unit. It is possible to remove individual basal segments, but in bronchiectasis all three left and four right basal segments are commonly involved and therefore the basal group will usually require their group removal. In one bilateral case the individual posterior basal segment was removed and the other three healthy basal segments were preserved.

The discrepancy between Figures 1 and 2 in the number of patients and the number of operations is due to two factors. First, many of these patients have bilateral processes requiring bilateral operations. Often a period of 3 to 6 months or more may elapse between stages. Twelve patients with bilateral disease have not yet had the contralateral lesions excised, but for completeness all the cases have been included. Second, it is our practice to do the most involved side first. Some of these patients are so greatly improved that the minimal symptoms from the contralateral side have not as yet warranted the second operation.

The preponderance of resections of the basal segments of the

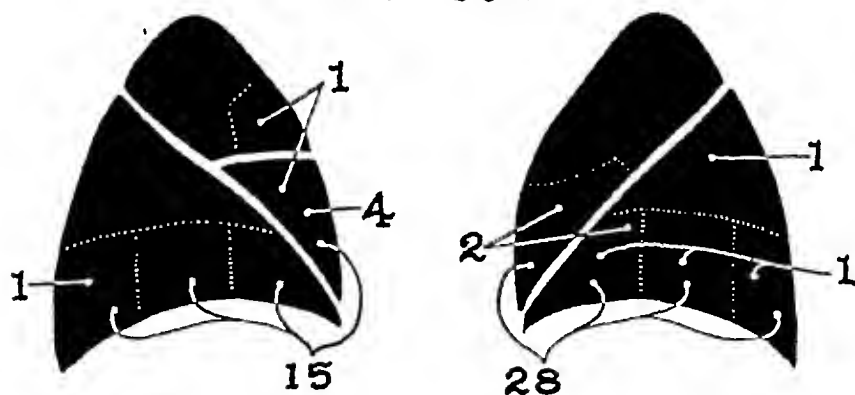
left lower lobe and the lingular segments of the left upper lobe is due to this combination being most frequent in our multilobar group, and to our practice of generally operating on the left side first when the lesion is about equally distributed between the two sides. As mentioned before, the uncompleted bilateral cases thus weight the figures in this group.

Fourteen patients have had bilateral operations completed. As a group they are strikingly better than the patients with bilateral disease treated by bi or trilobar resection. The pulmonary reserve of most is practically as good as before operation as no normal-functioning pulmonary parenchyma has been sacrificed.

There was one fatal case in the 39. This one has been reported elsewhere. The death was not related to the type of resection performed.

Morbidity and hospitalization for the segmental cases is lengthened on the average by 4 to 7 days. This is due in part to an occasional persistent air leak from the pulmonary surface and also to a desire to keep these patients under observation a little longer than the patients following a routine lobectomy. We believe the increased morbidity is not significant when the final result is so much superior. When the morbidity has been reduced

## RESECTED SEGMENTS FOR BRONCHIECTASIS 53 OP - 39 PT.



BILATERAL COMPLETE.. 14  
" INCOMPLETE... 12

FIGURE 5 Diagram illustrating the various segments that have been removed for bronchiectasis. There were 39 patients, 26 of whom had bilateral disease. Upon these patients 53 operations have been completed.

to that of simple lobectomy, then segmental resection should be extended to include the patient with unilobar disease

### SUMMARY

Bronchiectasis is usually a segmental rather than a lobar disease process. Surgical therapy should, ideally, remove all the involved segments without sacrificing any normal pulmonary tissue. Refinements and advances in diagnosis, localization, and surgical therapy now make such a goal attainable.

Fifty-three operations in 39 patients, with one death, are reported. All had at least two segments, or a lobe and a segment, excised. There are 26 cases with bilateral bronchiectasis in which bilateral operations have been completed on 14.

Segmental resection is especially applicable to patients with multilobar involvement where conservation of all normal pulmonary tissue is essential.

### RESUMEN

Por lo general la bronquiectasia es un proceso morbosito segmentario más bien que lobular. Lo ideal es que la terapia quirúrgica extirpe todos los segmentos invadidos, sin sacrificar ningún tejido pulmonar normal. Los refinamientos y adelantos en el diagnóstico, la localización y la terapia quirúrgica permiten ahora que se pueda alcanzar este objeto.

Se informa sobre 53 operaciones en 39 enfermos, uno de los cuales murió. En todos ellos se extirparon por lo menos dos segmentos, o un lóbulo y un segmento. Hay 26 casos con bronquiectasia bilateral, en 14 de los cuales se han completado operaciones bilaterales.

La resección segmentaria es aplicable especialmente a enfermos con afección multilobular, en los que es esencial que se conserve todo el tejido pulmonar normal.

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## DISCUSSION

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In planning the resection of a portion of a lobe or lung for bronchiectasis, the importance of accurate localization of the disease cannot be over-emphasized. The establishment of a diagnosis by the routine roentgenogram is neither reliable nor indicative of the extent of the disease. Bronchoscopy aids in excluding secondary bronchiectasis, but the segmental distribution of primary bronchial dilatation cannot be depicted with any degree of accuracy by this method. The absolute diagnosis and segmental distribution of the disease is dependent upon good lipiodol filling of all the bronchi to the multiple segments in both lungs. Many failures in the surgical treatment of this disease can be attributed to lack of pre-operative delineation of all the involved segments.

The characteristic broncho-pulmonary segmental distribution of bronchiectasis has been emphasized today. In a series of 75 bronchiectatic patients subjected to resection, I found the disease to be unilateral in 54 and bilateral in 21 cases. Of 34 cases with a single lobe involved, 4 had a single diseased segment and the remaining showed multiple diseased segments. Forty-one patients revealed pre-operative involvement of more than one lobe. In this series of cases the extent of the resection did not always parallel the extent of the disease. Marked symptomatic improvement following resection of the most advanced disease confined to one lung caused a few of the patients to decline an operation on the contralateral lung.

Doctors Overholt, Betts and Woods' observations and technical contributions to this subject are timely, emphasizing the importance of preserving healthy functional lung tissue and of offering a chance of a cure to many bronchiectatic patients who have heretofore been denied surgery because of extensive multilobar disease. It would seem that re-evaluation of many of the so-called hopelessly advanced cases of bronchiectasis is in order, for segmental resection of multiple lobes is being executed with safety terminating in a cure.

The individual treatment of segmental hilar structures in performance of a partial lobectomy requires a detailed and thorough knowledge of anatomy. Although excellent and detailed representation of the usual anatomy of some of the segments were presented and previously published by the authors, I feel as if the surgeon should devote considerable time to dissecting fresh autopsy specimens prior to carrying out the operation on a patient. De-

lineation of the various pulmonary segments by inflation and deflation of the fresh autopsy specimen is not too clearly defined on the surface, however, in the living the segmental surface demarcation of the diseased segment is usually obvious after ligating the bronchovascular structures to the segment. Segmental resection by the individual ligation technique is applicable to all segments of the lungs, however, removal of the basal segments (as a unit), lingula, superior segments and anterior segments (upper lobes) are more accessible and easier in execution. Excluding the lingula segment, I have performed 16 segmental resections for bronchiectasis and 4 such resections for other pathology. The surgical approach, identification and treatment of the bronchovascular anatomical structures, and surface delineation of the segment have been the same as presented by Doctors Overholt, Betts and Woods. The intersegmental plane is developed by blunt dissection by the authors whereas we have used sharp dissection cutting boldly through the lung parenchyma in a line of the intersegmental plane. Bleeding is negligible in that the parent artery to the respective lobe is temporarily occluded by drawing taut a previously placed ligature of umbilical tape. The raw surface of the remaining segment is covered by a pleural graft. In this small group of cases there were no postoperative empyemas, however, the evacuation of bronchial secretions is not as effective as in the average postoperative lobectomy. Postoperative bronchoscopy revealed in two cases where the remaining superior segment of the lower lobe was not aerating well anterior rotation of the segment orifice. This may be a factor in the development of postoperative atelectasis of this particular segment.

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# Noxious Gases and Bronchiectasis\*

DUANE CARR, M.D., F.C.C.P., W. E. DENMAN, M.D., and  
E. F. SKINNER, M.D.

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During the past three years we have had the opportunity of examining a large number of patients who have been employed in a government arsenal where shells are loaded with mustard gas. While working in the shell loading department, these patients are subjected to variable amounts of mustard gas in the atmosphere. The histories of these patients follow a fairly uniform pattern, as do the findings on physical examination, roentgenological examination with bronchograms and at bronchoscopy. We have seen these patients in all stages of development of the disease found in the bronchial tree, except the initial or acute stage, which is described for us by the Staff of the Station Hospital at the arsenal. Observation of these patients has given us a fuller understanding of the pathological changes which occur as a result of chemical burns of the bronchial mucous membrane, not only from mustard gas but from other chemical agents with which patients come in contact in civilian life.

The history of the acute phase of the chemical burn usually states that after a period of repeated exposure ranging anywhere from three weeks to six or seven months the patient begins to show signs of irritation of the conjunctival and respiratory mucous membranes. The patients develop conjunctivitis, photophobia, lacrimation, impaired vision, loss of taste and smell sensation, nose bleeds, sore throat, difficulty in swallowing, hoarseness, chest pain, retrosternal soreness, wheezing and dyspnea. In addition there may be anorexia, vomiting, weight loss, general weakness, insomnia, and irritability. When the patient is seen in the outpatient department of the Station Hospital, he is given symptomatic treatment and perhaps several days sick leave or temporary transfer to another department. After removal from the atmosphere containing mustard gas the symptoms all disappear except those referable to the respiratory tract.

The patients were referred to us by the United States Marine Hospital three months to two years following exposure. The acute symptoms had subsided but in their place has appeared a chronic cough of considerable severity, particularly prominent on retiring.

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\*Presented at the Annual Meeting, Arizona Chapter, American College of Chest Physicians, Phoenix, Arizona, May 1, 1946.

at night or upon arising in the morning The cough is usually productive of sputum varying from two tablespoonfuls of clear mucoid sputum to one or two cups of mucopurulent sputum daily There is usually a period of two months or so in the history when the sputum was blood streaked Occasionally frank hemoptysis has occurred As the disease progresses the patients complain of dyspnea, excessive fatigue, wheezing and, not infrequently, night sweats Pain in the chest is a prominent symptom and often a substernal soreness or feeling of rawness Spontaneous remission appeared in the histories of only three patients In all others the symptoms are of progressive severity A number of the patients complain of loss of weight but this is not a uniform observation

On physical examination, these patients are found to have a low grade fever usually not higher than 99.4° F Those patients having the most purulent sputum due to a secondary infection of their bronchi usually show an elevation of pulse rate as well The most constant physical findings are those of bilateral coarse moist rales with numerous wheezes heard on both inspiration and expiration throughout both lung fields In several patients, distant voice and breath sounds are heard

The laboratory of the United States Marine Hospital routinely obtained blood counts, sputum examinations for tubercle bacilli, urinalysis, blood sedimentation rate and blood tests The red cell count and hemoglobin levels were usually within normal limits, indicating that the mustard gas itself had no particular affinity for the hematopoietic system The white cell counts varied from normal to the upper limits of approximately 15,000 white blood cells This appears to depend more upon the amount of secondary infection in the bronchi than on any other factor The differential count was uniformly within normal limits The blood sedimentation rate varied from normal to 20 mm in the first hour, the large majority of determinations falling between 12 mm and 17 mm per hour The few patients with sputum positive for tubercle bacilli were excluded from this series Serological tests were within normal limits for the population group studied

X-ray films of standard technique are usually within normal limits in appearance Rarely, evidence of interstitial fibrosis is seen in the bases Eleven of the patients show an advanced stage of pulmonary emphysema as demonstrated by the depression of the diaphragm with blunting of the costophrenic angles and unusual penetrability of the lung fields

Bronchograms were made on one hundred forty-four of these patients and repeated at six month intervals on many of them The earliest change noted in the bronchi is an irregularity of the mucous membrane, the outline of the bronchial walls appear-

ing roughened or ragged This is not to be confused with the spotty filling obtained when a great deal of secretion is present in the bronchi In our terminology this roughening indicates damage to the mucous membrane and the diagnosis of bronchitis is made Unless roughening and irregularity is definitely present, the patients are listed as being "without demonstrable disease," regardless of the history Of the one hundred forty-four patients upon whom one or more bronchographic studies were carried out, fourteen showed no demonstrable damage to the bronchi in the bronchograms Sixty-four of the patients showed definitely ragged and irregular bronchial walls and were given a diagnosis of bronchitis

The next phase of the disease demonstrated in the bronchograms is a dilatation of the terminal bronchi These patients, as well as those with a marked dilatation of only two or three secondary bronchi, were given a diagnosis of minimal bronchiectasis Forty-one of these patients exhibited just such changes

Cylindrical dilatation of moderate extent in two or three lobes or even marked dilatation confined to one lobe is considered moderately advanced bronchiectasis in this series Thirty of the one hundred forty-four patients examined received this designation

Extensive cylindrical and saccular dilatation was found in sixteen patients who are termed far advanced bronchiectasis

Of the one hundred forty-four patients, eighty-seven exhibited a bronchiectasis of some degree We recognize that our designation of minimal bronchiectasis may be questioned by some authorities However, there is a total of forty-four patients, almost one-third of the entire group, showing moderately advanced or far advanced bronchiectasis which is beyond question

Bronchoscopic examination was carried out on eleven of these patients to learn more about the pathological changes in the bronchial mucous membrane in relation to the appearance of the bronchograms The mucous membrane of the major bronchi is inflamed and edematous in those patients with the more active symptoms In two of the patients who had previous bronchograms and who had been bronchoscoped, the bronchoscopy was described as normal However, biopsy specimens taken from the bronchial wall showed evidence of a mucous membrane which had been destroyed and which had undergone regeneration The epithelium varied in cellular structure from an almost squamous cell to a low columnar epithelium totally without cilia Others showed no evidence of active inflammation but the bronchial wall appeared irregular, scarred and the usual velvety sheen of a normal ciliated epithelium was lacking

Our observation of these patients leads us to postulate that the pathological changes begin with an acute chemical irritation or

burn of the bronchial mucous membrane followed by inflammation resulting in the loss of bronchial elasticity and ciliary action. This interferes with the normal evacuating mechanism of the lungs. Secondary infection supervenes, causing further localized damage to the bronchial wall and, in many instances, leading to sufficient erosion to destroy the elastic tissue fibers. In those areas bronchiectasis results. It appears to be during the period of ulceration and destruction that the blood streaked sputum and hemoptyses occur.

We have been inclined to apply the term hypertrophic bronchitis to those patients in whom wheezing, dyspnea and a sense of tightness in the chest are the outstanding symptoms and in whom the bronchograms show attenuated bronchi throughout. These are the patients with the inflamed and swollen mucous membrane. However, when the condition evolves into the stage in which regenerated but atrophic epithelium is found, the term atrophic bronchitis might well be more applicable. It is the group of patients with wheezing, attenuated bronchi, and hypertrophied or swollen mucous membrane which develop the severe pulmonary emphysema seen in eleven of these patients.

As consultants for the United States Marine Hospital we have not had the opportunity of personally supervising the treatment of these patients directly. Our recommended treatment has been a routine of fifteen grains of ammonium chloride four times a day, postural drainage with forced coughing for two or three minutes four times a day, a high fluid intake and complete abstinence from smoking. Removal from the irritating fumes is likewise advised. For acute febrile episodes, or for all patients whose purulent sputum is excessive in amount, we are now recommending that penicillin both parentally and by inhalation be given.

To date no lobectomy has been performed on any of these patients although a number have had demonstrable bronchiectasis in only one lobe. So many of the patients on repeated examinations with bronchograms have shown progressive disease that we have hesitated to perform a resection until the bronchiectasis has been demonstrated to be stable and to have reached its maximum development.

The bronchial drainage routine outlined, when faithfully carried out, results in a marked reduction in cough and sputum, improvement in appetite and usually in a marked gain in weight. In only two patients have we seen any remarkable reduction in the caliber of the dilated bronchi. Few of the patients admit relief from dyspnea on heavy exertion. We find no record of recurrence of bloodstreaked sputum or hemoptysis in a patient following the bronchial drainage routine faithfully. Those patients whose mental

capacity permits them to do work other than heavy manual labor find it possible to hold a job as long as the bronchial drainage routine is carried out

### SUMMARY

The effects of repeated exposures to varying concentrations of mustard gas as reflected in the bronchial tree are described, based upon observation of one hundred forty-four patients who were employed in a gas shell loading plant. It may reasonably be assumed that similar changes in the bronchi will be observed as a result of chemical burns due to other agents such as concentrated ammonia fumes, slack lime, etc., as encountered in industrial work.

It is shown that forty-six of one hundred forty-four patients have developed a definite moderately or far advanced bronchiectasis. An additional forty-one patients exhibit a minimal bronchiectasis. In combination with minimal bronchiectasis, or as the only demonstrable anatomical change, bronchitis was demonstrated in sixty-four patients. Asthmatic bronchitis associated with hypertrophic bronchitis or atrophic bronchitis was found in forty patients. Eleven patients had advanced bilateral pulmonary emphysema.

The treatment applied to all cases consisted of a bronchial drainage routine including ammonium chloride, 15 grains four times a day, postural drainage with forced coughing for two or three minutes four times a day, a high fluid intake and abstinence from smoking. Removal from contact with mustard gas was likewise recommended. Patients with asthmatic symptoms were benefited by supplemental use of Tedral (theophylline, ephedrine and phenobarbital) as a "bronchial relaxing" agent. Penicillin therapy by injection and by inhalation has been more recently used by those patients with marked secondary infection in the bronchial tree.

The majority of patients faithfully following this routine have been able to work at sedentary occupations which do not require heavy physical exertion. The emphysema patients are totally disabled.

As yet no pulmonary resection has been carried out in this group because of the progressive character of the pathology observed.

A review of this group of patients five years from now will be of extreme interest and help in evaluating disability following exposure to noxious fumes and chemical agents.

### RESUMEN

A base de observaciones llevadas a cabo en ciento cuarenta y cuatro pacientes que trabajaron en una planta en la que llenaban granadas con gas, se han descrito los efectos sobre el árbol bron-

quial de repetidas exposiciones a diferentes concentraciones del gas mostaza. Es razonable suponer que se observarán alteraciones semejantes en los bronquios como resultado de quemaduras químicas causadas por otros agentes, tales como vapores de hidróxido de amonio concentrado, hidróxido de calcio, etc., que se usan en el trabajo industrial.

Se demuestra que en cuarenta y seis de los ciento cuarenta y cuatro pacientes se ha desarrollado una bronquiectasia bien definida, desde moderada a muy avanzada. Otros cuarenta y un pacientes manifiestan una bronquiectasia mínima. Se comprobó bronquitis en sesenta y cuatro pacientes, ya en combinación con bronquiectasia mínima o como el único cambio anatómico demostrable. En cuarenta pacientes se encontró bronquitis asmática asociada con bronquitis hipertrófica o atrófica. Once pacientes tenían enfisema pulmonar bilateral avanzado.

El tratamiento aplicado a todos los casos consistió de un programa rutinario de canalización bronquial que incluyó la administración de cloruro de amonio (un gramo cuatro veces al día), canalización por postura con tos forzada por dos o tres minutos, cuatro veces al día, la bebida de grandes cantidades de líquidos y abstinencia de fumar. También se recomendó cesar el contacto con el gas mostaza. Los pacientes con síntomas asmáticos obtuvieron efectos beneficiosos mediante el uso suplementario de Tedral (teofilina, efedrina y fenobarbital) como agente "dilatador de los bronquios." Más recientemente, el tratamiento con penicilina por inyección y por inhalación ha sido empleado en esos pacientes con marcada infección secundaria del árbol bronquial.

La mayoría de los pacientes que han observado fielmente este programa rutinario han podido trabajar en ocupaciones sedentarias que no requieren esfuerzo físico pesado. Los pacientes con enfisema están totalmente incapacitados.

Hasta ahora no se ha llevado a cabo ninguna resección pulmonar en este grupo debido al carácter progresivo de los procesos patológicos observados.

Un análisis de este grupo dentro de cinco años sería muy interesante y ayudaría a apreciar la incapacidad causada por la exposición a vapores y agentes químicos nocivos.

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# Work Capacity Its Role in the Treatment of Tuberculosis\*

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The treatment of tuberculosis, based as it is upon the concept of bed rest, has as its ultimate objective the restoration of the patient to a state of relative well-being and a capacity for participating in a program of work which is consistent with his handicap. For the physician who treats the tuberculous patient, for the others who are interested in the other aspects of his rehabilitation, and for the patient himself, the problem of absolute bed rest has been a vexing one. Countless papers have been written dealing with the factors which prompt patients to leave tuberculosis hospitals against medical advice, and not a few have referred to the inability of patients to adjust to the bed rest regimen.

The physician must rely for the most part upon his experience and empirical judgment to determine at what time the patient may begin his activity and how much activity he may undertake. Neither qualitative nor quantitative yardsticks have yet been developed by which the amount of activity in which a tuberculosis patient participates may be measured, with perhaps the possible exception of the time factor. Thus a patient for whom activity is prescribed is told that he may devote a half hour twice each day to reading, studying, occupational therapy, or related work.

With the development of rehabilitation programs for tuberculous patients during recent years, it has become increasingly apparent that evaluation of their work capacity constitutes a significant factor in assisting them to evolve vocational readjustment plans consistent with their physical limitations. The ability of the patient to sustain, without untoward effects, an activity program when his pulmonary lesion has become stabilized enters into the evaluation of his clinical status. Thus the patient

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with an unstable pulmonary lesion is classified as "active" clinically or pathologically, and is generally kept at absolute bed rest until the lesion stabilizes. Activity, in most instances, is permitted only after a lesion has become stable. The patient then progresses through graduated levels of activity, more or less following a "time table," unless a flare-up occurs. At the time of discharge, the patient who has reached the classification "arrested" has a work capacity for one hour of walking exercise twice daily, or its equivalent, having shown that he has been able to sustain such a program for a period of two months without reactivation of his symptoms of his lesion. For some time now, it has been obvious to many of us that this activity level is insufficient to meet the conditions which the patient must encounter in the work-a-day world. Furthermore, the physician is unable to predict with any assurance just how well the patient will tolerate a given work experience because in most instances it has not been possible in the hospital to observe the patient's reaction to activity similar to that which he will be subjected to in the job of his choice.

Recent studies have yielded information which may contribute to a better understanding of the physiology of bed rest and exercise and may possibly suggest useful techniques which may be applied in the management of pulmonary tuberculosis. In a series of carefully controlled observations, using conscientious objectors, Keys<sup>1</sup> found that, following a six week period of absolute bed rest, otherwise normal subjects demonstrated significant signs of physical and mental deconditioning. He reports that, while there is relatively little loss in simple muscular coordination, endurance, postural coordination, and adjustment are quickly impaired. Cardiocirculatory capacity and efficiency are reduced, the blood volume diminishes, the heart becomes smaller, and a relative tachycardia develops even in basal rest. He also has found rather clear indications that tissue metabolism is affected. The body goes into negative nitrogen balance, requiring an appreciable increase in protein intake to restore normal balance. A negative calcium and potassium balance is also observed, further suggesting that tissue disintegration is taking place. Thiamine, vitamin C, and riboflavin appear in the urine in unusual amounts. These observations are especially interesting since similar phenomena are not uncommonly associated with the clinical findings in tuberculosis. Barr and his co-workers<sup>2</sup> have reported substantially similar data and, in addition, a marked hyper-reaction to the tilt table. These findings become even more significant when related to the observations of Bray<sup>3</sup> who questions the value of absolute bed rest in treating pulmonary tuberculosis in patients who show good nutrition and are symptom free or practically so. Bray cites the paucity



of published studies which contain strong evidence that strict bed rest is significantly more effective than prescribed and graduated activity. He further observes that curtailment of activity has a definitely deleterious effect upon muscle tone and mental attitude.

Recognition of the fact that patients, subjected to strictly limited opportunities for exercise or related activity during their illness, developed tangible evidence of both physical and mental degeneration, prompted the development by the Army and the Navy of reconditioning programs in the various service hospitals during the recent World War. This type of therapy materially helped to restore thousands of men to maximum levels of efficiency and, simultaneously, shortened the length of their hospital treatment. Patients were brought to a peak of physical fitness through a reconditioning process which included physical therapy, occupational therapy together with competitive team play, supervised and graduated calisthenics, and active recreation. The mental aspect was not neglected. Patients were encouraged to enroll in a variety of study courses which were developed by the United States Armed Forces Institute. Many patients in Army and Navy hospitals were thereby able, successfully, to complete and receive academic credit for the educational work which they took. The rehabilitation value of this reconditioning program has been adequately demonstrated.

These observations suggest that basal physiologic rest should be prescribed with as much care as is an activity regimen. It should be noted that none of the studies which have been cited discounted the value of bed rest as a therapeutic measure. If any conclusion may be drawn, it would suggest that greater consideration be given in prescribing basal physiologic rest, to the amount required and for what length of time. Furthermore, the effects of too much rest should be considered. This concept does not seem to be inconsistent with the present principles of bed rest therapy in the treatment of pulmonary tuberculosis.

It therefore seems quite clear that to be effective, a work capacity program for tuberculosis patients should be predicated upon a consideration of the following: the factors which determine how soon a patient may be permitted to begin an activity program, the factors which determine the amount and type of activity prescribed, and the factors which determine when and by how much, activity may be increased.

There is no doubt regarding the necessity for restricting the activity of the patient who is toxic and shows the characteristic elevated temperature, pulse, and erythrocyte sedimentation rate, is in poor nutrition, or whose pulmonary lesions are in any way

suggestive of an acute tuberculous process. At such time, however, as the toxicity has subsided, the patient has improved nutritionally, and there is evidence that the pulmonary lesion is retrogressive, it would appear that an activity prescription may be considered.

Based upon the studies which have been cited and some work done by Covalt and Covalt,<sup>4</sup> we are presently studying a program of mild, graduated exercises which are to be given by physical therapists under medical supervision. These exercises are particularly designed to teach the patient how to relax and thereby enable him to tolerate a bed rest regimen which will still constitute the major portion of his therapy. At the same time, however, it is intended that these exercises will initiate the restoration and maintenance of muscle tone. An indication of the type of exercise which will be employed may be obtained from a brief description of the first series which will be prescribed for the patient who has been on complete bed rest and has reached the point of being able to sustain a minimum of activity. The exercises are demonstrated to the patient by the physical therapist to insure that he understands the procedures.

(The following exercises are done by the patient while lying flat on his back. They are repeated four times each day at prescribed times.)

1. Curl the toes downward and at the same time bend the foot upward at the ankle. Relax and repeat three times. Exercise one foot at a time.

2. Repeat exercise number 1, but this time rotate the foot upward and inward so that the sole of the foot may be seen. Relax and repeat three times.

3. Keep the leg straight. Tighten the muscle on the upper surface of the thigh, pulling the kneecap upwards. Relax and repeat three times.

4. With the legs flat on the bed and about twelve inches apart, rotate the legs inward keeping the knees straight. Relax and repeat three times.

5. Clench the fingers of your hand to make a fist. Relax, stretching the fingers open and apart. Relax and repeat three times. Do this exercise one hand at a time.

The patient's reaction to this exercise program will be closely observed. If it is found that he is able to sustain the preliminary series, the second set of exercises will be prescribed and his reaction similarly noted. In this manner, we propose to increase the amount of activity and simultaneously the length of time integrated with this exercise program and depending upon the patient's interests, he will be permitted to read and sit up for

his meals The total amount of such activity will be kept within the time limit specified by the physician As the patient demonstrates continued progress in dealing with his disease, the activity prescription will be increased and occupational therapy and educational therapy facilities will be introduced These will be determined by evaluating the patient's interests and aptitudes

It should be evident that the only criteria which we now have are those which indicate that the patient shows no untoward elevation of temperature, pulse rate, or sedimentation rate of the red blood cells, and, further, that roentgenologically his lesion shows continued retrogression However, as patients progress to ambulatory status and their activity program becomes diversified, the problem of evaluation becomes more complicated The physical demands of different types of activity vary Consequently, walking along level ground does not require as much energy output as climbing a hill Similarly walking may logically be expected to require more effort than work at a desk or a work bench The effect of these factors on fatigue must also be considered The determination of activity equivalence is therefore a problem which will require special study We propose to study our patients as they perform at their various activities and record the effects of measured amounts of work upon body temperature, pulse rate, erythrocyte sedimentation rate and similar physiologic reactions It may be particularly interesting to observe the effect which such a program of graduated exercise and work will have upon calcium and potassium balance, and also upon the thiamine, vitamin C and riboflavin output It would also be of particular interest to make these determinations in individuals with active pulmonary tuberculosis who have not as yet begun their bed rest regimen Because our program is just now being developed, we have not been able to obtain data for inclusion in this paper We are hopeful that this will be possible in the near future and that this discussion will stimulate investigation of this question by others It seems possible that such study may yield some information which may serve as the basis for a better understanding of the problem of bed rest and work capacity

While seemingly unrelated to the question of work capacity, the deformity which not uncommonly follows thoracoplasty does have associated with it limitation of arm and shoulder function and, of course, the mental reaction of the patient It may consequently be of interest to report on the program which is being developed at the Veterans Administration Hospital at Oteen which we expect will prevent the deformities and other functional defects which have been referred to The success of similar programs which were employed by British workers and later in our Army

hospitals has recommended this approach to us. By individual preoperative and postoperative treatment and instruction given the patient by the physical therapist under the supervision of the surgeon and the physician-in-charge of Medical Rehabilitation, the patient is taught the principles of correct posture. Following surgery a series of mild, graduated exercises is prescribed and the patient is encouraged to use the arm on the operated side rather than keep it splinted to his side and inactive.

The work capacity program which we are developing is the principal mission of the Medical Rehabilitation Service, following the pattern so successfully demonstrated by the convalescent programs developed by the Armed Forces. As established by the Veterans Administration, the Medical Rehabilitation Service at our hospital at Oteen, North Carolina, which is almost wholly devoted to the treatment of tuberculosis, consists of four component units: Physical Therapy, Occupational Therapy, Educational Therapy, and Manual Arts Therapy. Under medical supervision, the work of each is coordinated to provide the patients diversified yet regulated activity which is both therapeutic and purposeful. As early as is consistent with his physical condition and his intellectual interests, each patient is permitted to participate in work, study and recreation designed both to enable him to explore his interests and aptitudes in a variety of vocational pursuits and also to enable the patient's physician to observe his ability to sustain such a program of activity.

### SUMMARY

The concept of work capacity as applied in the treatment of pulmonary tuberculosis has been reviewed in the light of several recent studies of deconditioning phenomena. The question has been raised as to whether prescribed and carefully graded exercises may be effective in minimizing physical deconditioning of tuberculous patients if employed prior to ambulation. The need for more objective criteria for evaluating work capacity is suggested and a work capacity program outlined.

It is the hope of the authors that the views presented here will stimulate further study of these problems.

### RESUMEN

A la luz de varios estudios recientes sobre los fenómenos del reacondicionamiento se ha analizado el concepto de la tolerancia al trabajo, en su aplicación al tratamiento de la tuberculosis pulmonar. Se ha discutido el problema de si los ejercicios prescritos y cuidadosamente graduados podrían ser eficaces para reducir al mínimo el reacondicionamiento físico de pacientes tuberculosos,

si se practicaran antes del período ambulante Se indica la necesidad de emplear criterios más objetivos para avaluar la capacidad para el trabajo, y se bosqueja un plan de tolerancia al trabajo

Los autores abrigan la esperanza de que las opiniones aquí presentadas sirvan de estímulo para que se emprendan estudios adicionales sobre estos problemas

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# Transitory Pulmonary Infiltration (Loeffler's Syndrome)\*

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In 1932, Loeffler<sup>1</sup> described a series of five cases in which pulmonary shadows appeared and disappeared rapidly. Extensive lung changes were accompanied by minimal clinical symptoms and by high grade blood eosinophilia. In 1936, he<sup>2</sup> reported additional cases bringing the total number observed by him to 51. The symptom complex was recognized by its three chief features: (1) a roentgen shadow in the lung fields, (2) the transitory or migratory character of the infiltrations, and (3) the accompanying blood eosinophilia which ranged from 6 to 66 per cent. Fourteen of his 51 cases were discovered on routine fluoroscopic examinations of patients who had no symptoms directly referable to the chest. This surprising absence of constitutional disturbance was regarded by Loeffler as a fourth, and not unessential diagnostic feature. Acoustic signs usually were slight or might be completely lacking. In many cases, there was an irritative cough, often of considerable intensity, with or without stabbing chest pain. Expectoration was lacking or scant, yellowish, muco-albuminous, but poor in cells. Occasionally, but not always, a few eosinophile cells were found. When sputum was obtained, it was always negative for tubercle bacilli. In rare instances, he observed pleural participation in the process, and still more rarely, a very small circumscribed pleural effusion, distinguishable in the roentgenogram or on fluoroscopy from the infiltrations. These pleural phenomena were likewise fleeting in character. The infiltrations observed were compared by Loeffler to the transitory lesions of erythema nodosum. In both conditions, fleeting inflammatory reactions occur, and he believed them to be the result of an allergic tissue reaction to many different antigens.

Following Loeffler's description, a number of similar reports have appeared in the literature and the cumulative evidence has made it increasingly clear that the syndrome results from an allergic tissue reaction as was hypothesized by him. As was predicted, a great variety of noxious agents such as ascaris,<sup>3</sup> trichinal,<sup>4</sup> and amoebic infestation,<sup>5,6</sup> brucellosis,<sup>7</sup> the pollen of privet,<sup>8</sup> pron-tosil,<sup>9</sup> and gold<sup>10</sup> have been reported as causative agents.

\*From the Department of Medicine, Marquette University School of Medicine, Milwaukee, Wisconsin. Presented at the Annual Meeting, Wisconsin Chapter, American College of Chest Physicians, Oct. 6, 1946.

Because the condition is essentially benign, the histological characteristics remained conjectural until 1942 when H von Meyenburg<sup>11</sup> described eosinophilic pulmonary infiltrations found in four patients after accidental death. These infiltrations varied in form and shape, and they varied likewise in location. High grade eosinophilia in the exudative-inflammatory lung nodule was common to all. Eosinophilic bronchitis and bronchiolitis was present in two cases, but was lacking in the other two. Based on the lesions found, von Meyenburg expressed his belief that such infiltrations were not necessarily always transitory. Harkavy<sup>12</sup> reported a series of asthmatic patients in whom polyvalent sensitization was present. Symptoms were precipitated synergistically in at least seven of these patients. In one patient, subcutaneous injection of an autogenous vaccine composed of various bacteria grown from sinus washings repeatedly was followed by asthma, pulmonary infiltrations and petechiae which were regarded as indicative of an hyperergic vascular response. He emphasized that symptoms in bacterial allergy may be reactivated not only by the specific bacteria responsible for the initial sensitization, but also by heterologous bacteria, nonbacterial antigens and possibly by viruses. Such heterologous reactivation of symptoms is comparable to the Sanarelli-Schwartzman phenomenon. Patients with multiple shock tissues reacted not only in the bronchi, but in vessels of the pulmonary parenchyma and other tissues as well and characteristic transitory pulmonary infiltrations of the Loeffler type were observed repeatedly. The milder vascular reactions were regarded as reversible, and in eight patients of the group reported by Harkavy, removal of offending agents was followed by arrest and reversal of the disease process. However, repeated attacks resulted in chronic allergic inflammatory changes in the inter-alveolar septa and progressive vascular changes.

Allergic infiltrations are not confined to pulmonary tissues alone. von Meyenburg described eosinophilic infiltration of an epididymis removed surgically from a patient in whom transitory pulmonary infiltrations had been observed previously. Likewise, brawny infiltrations were observed by Harkavy in the thigh of a patient who had fleeting pulmonary infiltrations accompanying asthmatic attacks. Biopsy showed these lesions to be eosinophilic infiltrations. Klopstock and Steinitz<sup>13</sup> reported similar migratory reddened swellings which recurred in scattered areas of the body and were accompanied by increased leucocyte counts varying from 12,000 to 15,000 and high grade eosinophilia.

Marked perivascular collections of leucocytes were observed in the nodular infiltrates in two of von Meyenburg's cases. Harkavy emphasized the periarterial lesions in his fatal cases. Periarterial

lesions in association with transitory pulmonary infiltrations also were observed by Lindberg and Baggenstoss<sup>14</sup> in a 59 year old woman whose death from asthma occurred seven years after her first attack. For several months transitory pulmonary shadows of varying size had been accompanied by eosinophilia as high as 35 per cent. Necrotizing arteritis and arteriolitis were found at necropsy.

Three cases of transitory and migratory pulmonary infiltration which fulfill the criteria established by Loeffler are presented. In each instance there is a background of extrinsic asthma. The first two patients exemplify the early, completely reversible stage generally regarded as characteristic of Loeffler's syndrome. The third patient demonstrates a later stage in which roentgenograms now indicate increasing residual fibrosis of pulmonary tissues.

### CASE REPORTS

*Case 1* W.A.M. Male, age 27. Since his first year there have been recurrent attacks of asthma some of which were caused by contact with danders and dust. Symptoms were somewhat more severe during summer months, although attacks occurred throughout the entire year. Nasal polyps were removed at age twelve. At seventeen, he was given injections of dust, grass, and ragweed antigen for three years without appreciable improvement. For the past six years Tucker's asthma spray has been used with moderate symptomatic relief. Infantile eczema which appeared during his first year cleared when he was two. At puberty, eczema recurred and has persisted in mild form since. Slight dermatitis was present over both malar regions and on the neck when he was first seen. The nasal mucous membranes were pale boggy, and appeared typically allergic. The sinuses transilluminated well. Inconstant asthmatic whistles were heard over the chest. Heart sounds were normal with blood pressure 116/74, and vital capacity 3.5 liters. Mantoux test with 0.1 mg. old tuberculin was positive. Sputum was negative for tubercle bacilli.

He was found by skin testing and clinical observation to be sensitive to house dust, feathers, dog, cat, and horse dander, grass and fall pollens, and to alternaria and hormodendron spores. He has since been given perennial treatment with dust pollen, and mold antigen, with improvement in his asthma although occasional attacks have continued. In April 1943, he was seen after mild asthma of two days' duration. He had worked all day and although he did not appear ill, his face was somewhat flushed and his temperature was found to be 103°. No abnormal physical signs were discovered on chest examination. The next day his temperature was normal. Similar febrile episodes occurred in May, October and December of that year, usually preceded by a day or two of increased asthma. On January 2, 1945, he reported that seven days previously he felt flushed and chilly when he reached home from work. That evening, his temperature was 103° and at 4:00 A.M. he had a drenching sweat, followed by normal temperature thereafter. After one day at home, he returned to work feeling quite normal. No unusual chest findings were present on January 2, and on January 4, apart from some diffuse emphysema, the lungs were roentgenologically negative.

June 25, 1945 he reported that there had been considerable coughing



throughout the preceding day and some irritation remained in his throat. No abnormal chest findings were present. There was slight redness of the posterior pharyngeal walls, and his temperature was 99.4°. He was given 15,000 units of penicillin aerosol nebulized by oxygen at 3 liters per minute. One hour later, he reported a chill and temperature of 103.6°. When admitted to the hospital four hours later, his temperature was 103.2° and the leucocyte count was 14,800 with 88 per cent neutrophils and 2 per cent eosinophiles. Chest roentgenogram at this time showed a walnut size infiltration in the anterior portion of the right lung at the level of the fifth rib. No abnormal physical signs were detected over this area or elsewhere, and in spite of the fever he did not appear ill. The next day his temperature was 99.0° and the leucocyte count was 17,550 with 72 per cent neutrophils and 1 per cent eosinophiles. Because this attack resembled previous ones in all respects and because he did not feel ill, he returned home. The following morning his temperature was 99° and was normal thereafter. Roentgenogram on July 2 showed the area of involvement to be almost clear. No blood count was made on this date, but on July 25 the leucocyte count was 7,300 with 55 per cent eosinophiles.

*Case II* T.G., a boy who was seen first in 1937 at the age of four, had perennial rhinitis and recurrent attacks of asthma. Infantile eczema began at six months and persisted until he was about a year and a half old. Characteristic asthmatic breath sounds were present and the nasal mucosa was boggy and typically allergic in appearance. Skin tests showed sensitivity to house dust, alternaria, and the pollens of grass and ragweed. Dust precautions were instituted and perennial hyposensitization has been carried out with the antigens named with considerable general improvement. A bronchoscopic examination in 1940 showed only findings compatible with asthma. Occasional episodes of asthma usually have been associated with upper respiratory infections. Sputum examinations were repeatedly negative. Chest roentgenograms were normal apart from emphysematous appearing lung fields.

November 17, 1945, his mother reported much coughing and a temperature of 99.4° because of which sulfonamides had been given. Mild fever continued and on November 23, he entered the hospital. Chest roentgenogram on admission showed considerable infiltration about both hilar areas, extending on the left side for a considerable distance toward the periphery of the lungs. The temperature was 102°. There was normal resonance everywhere over the chest, with scattered asthmatic whistles present. Medium-sized inconstant sticky rales were heard in the left front chest at the level of the fifth interspace. Leucocyte count in the morning was 28,000 with 2 per cent eosinophiles. Sputum cultures on admission showed no unusual organisms. He was given 10,000 units of penicillin intramuscularly every three hours and in addition, he was given penicillin aerosol. His temperature continued to rise to 101 or 102° each afternoon. Roentgenogram on November 28 showed bilateral hilar infiltration which was now marked on the right side, and had somewhat subsided on the left. Intramuscular penicillin was discontinued November 30, when it was apparent that its use had resulted in no appreciable change. Throughout this time, his general condition had been good with no evidence of toxemia consistent with the pulmonary involvement present. On December 3, chest roentgenogram showed that the intrapulmonary infiltration had largely disappeared. The transitory and migra-

tory character of the roentgen shadows now made the diagnosis of Loeffler's syndrome quite certain Mantoux test on December 3 was negative with 0.1 mg tuberculin Stool examination was negative for ova and parasites, and agglutination test for *B. abortus* was negative

In early February, he had a frank upper respiratory infection and raised yellow, purulent sputum Again March 30, he was seen with a reddened throat, a temperature of 101.6° and had scattered sibilant asthmatic rales in the chest Fever continued for about a week and subsided after oral penicillin

TABLE I

Blood counts in Case II during two episodes of pulmonary infiltration

Date	W.B.C.	Neut Seg	Neut Stab	Eos		Mono	Lymph
				P E R	C E N T		
24 Nov '45	28,500	75.0	8	2	2	13	
26 " "	17,700	63.0	2	9	7	19	
27 " "	18,250	73.0	5	4	5	13	
28 " "	16,200	71.0	3	8	3	15	
29 " "	17,150	50.0	6	12	6	25	
1 Dec "	12,400	58.0	6	9	7	20	
2 Jan '46	15,600	53.5	0.5	19	3	24	
19 " "	11,200	51.0	2.0	17	6	24	
21 Aug "	7,200	50.5	2.0	11	0	35.5	
23 " "	12,300	45.0	1.5	21.5	2	30	
30 " "	12,850	54.0	2.0	17	2	25	
7 Sept "	8,800	45.0	1.5	18	3	32.5	
21 " "	11,800	48.0	1.0	16	2	33	

August 4, he had severe asthma which lasted three days during which he stayed in his room equipped with a pollen filter On August 17, chest roentgenogram showed a new infiltration in the first and second interspace on the left side which remained without appreciable change in roentgenograms of August 23 and September 3

Leucocytes on August 21 numbered 7,200 with 11 per cent eosinophiles and 12,300 with 21.5 per cent eosinophiles on August 23 A sputum specimen on August 21 contained masses of purulent yellow material, with many eosinophiles and pus cells present, but no Curschmann's spirals or Charcot-Leyden crystals No acid-fast bacilli were found and there was no growth of fungi on Sabouraud's medium. Beta hemolytic streptococci, *S. viridans*, and *N. catarrhalis* were present in blood agar sputum cultures Albumen (grade 2) was found in the urine August 23 with 1-2 R.B.C. and 4-6 W.B.C. per high power field No casts were present (Previous urine specimens in June and July were negative) Urine culture on August 23 showed a fairly heavy growth of hemolytic staphy-

lococcus aureus and colonies of alpha hemolytic streptococci and *S. viridans*

Throughout this period he did not feel especially ill, although his general appearance was not good. The presence of hemolytic cocci in the sputum and urine during the course of this last episode are felt to indicate that bacterial allergy was responsible in part, at least, for the pulmonary infiltration observed. Unequivocal proof of causal relationship is, however, lacking.

*Case III* J. A. B., developed typical ragweed hay fever in 1928 at the age of seventeen. Symptoms recurred each fall thereafter with increasing severity. During the winter of 1935, while installing a heating system in a burlap bag factory, asthma occurred for the first time. Wheezing stopped at once after he left the building and there was no recurrence of asthma until 1940 at the peak of the ragweed season. Nasal symptoms which at first were confined to the fall season, gradually became perennial, although maximum rhinitis continued to occur in the spring and fall. In mid-May 1942, he observed dyspnea and some wheezing while climbing stairs and a diagnosis of virus pneumonia was made by his physician. Chest roentgenogram a little later showed infiltration of the left apex. A Mantoux tuberculin test at this time was positive. Repeated sputum examinations including cultures were negative for tubercle bacilli. He remained at home for seven weeks with bed rest during the first three. Roentgenogram June 3, 1942 showed the lung fields clear.

Throughout the summer of 1942, he had considerable rhinitis and during the ragweed season there were ten or twelve sharp attacks of asthma. In November 1942, a preemployment roentgenogram showed infiltration of the right middle lobe. Sputum and gastric specimens were negative for tubercle bacilli. November 30, 1942, he entered Muirsdale



FIGURE 1

FIGURE 2

*Figure 1* Case 3 May 25, 1942 Extensive infiltration, left upper lobe—*Figure 2* Case 3 June 3, 1942 Essentially clear. Questionable haziness in left subapical region.

Sanatorium where he remained until January 23, 1943. During this period, repeated sputum examinations showed many eosinophiles but were negative for tubercle bacilli, stool examinations were negative for ova, amoebae, and parasites, muscle biopsy and skin test were negative for trichiniasis. A bronchoscopic examination showed nothing unusual and direct smear made from the secretions showed no fungi. During this period, there was a mild leucocytosis at times and eosinophiles fluctuated between 5 and 14 per cent. At no time did he appear ill and a tentative diagnosis of Loeffler's syndrome was made on discharge.

He later gave the additional story of occasional hives in childhood and reported two injections of antitetanic serum in the past without reaction. His mother had been subject to headaches, a maternal uncle had allergic rhinitis, and his five-year-old son has hay fever. Cutaneous reactions were present to tree, grass, and fall pollens, to alternaria spores, and to house dust. With the exception of tree pollens for which no passive transfer tests were made, circulating reagins were demonstrated for these antigens and for wheat and rye. He has had perennial hypersensitization with the indicated inhalant allergens for the past three years with definite clinical improvement. However, there have been occasional mild asthmatic attacks and he has had several episodes of pulmonary infiltration sometimes preceded by malaise, cough, and increased asthma, but at other times infiltrations have been discovered on a routine roentgen recheck of the chest in the absence of any accompanying symptoms.

During the height of the 1943 ragweed season, there was slight asthma which continued into October. On November 26, after spreading marsh hay over his garden, he had a sharp attack of asthma which lasted for several days. On December 9, he had generalized grippe-like aching and some pain under the left shoulder. Medium-sized moist rales were present at the end of inspiration in the left infraclavicular region. His tem-

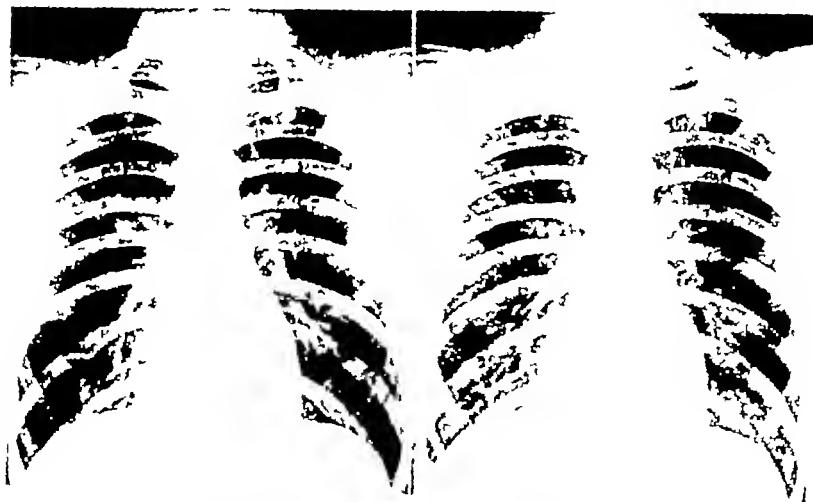


FIGURE 3

FIGURE 4

Figure 3 Case 3 Jan 4, 1943 Infiltration in right mid-lung field. Sharply circumscribed grouped nodules.—Figure 4, Case 3 May 22, 1943 Lung field clear

perature was  $100.4^{\circ}$ , and the leucocyte count was 8,550 with neutrophils 77.5 per cent and eosinophiles 3.5 per cent. Roentgenogram at Mulriddle Sanatorium December 11 showed dense infiltration in the left hilar region at the level of the second and third ribs anteriorly. Roentgenogram on December 18 showed marked clearing, and another December 24 showed still further improvement. During this episode, a single sputum specimen was reported positive for tubercle bacilli after culture and guinea pig inoculation. Since that time, repeated sputum cultures and guinea pig inoculations have all been negative for tubercle bacilli.

Roentgenogram April 18, 1944, showed a new and rather extensive infiltration in the right upper lung field with some residual fibrosis still visible in the left infraclavicular region. Leucocyte count was 6,950 with 22 per cent eosinophiles. Sputum culture was again negative for tubercle bacilli. Except for very slight wheezing which occurred on the night of April 25, there were no clinical symptoms during this period of pulmonary infiltration. No rales or physical signs were disclosed on examination other than those demonstrated in the roentgenogram, and he continued to work throughout this period without subjective feeling of illness. In the fall of 1944, considerable asthma, September 16 to 18, coincided with high atmospheric concentrations of alternaria spores, and subsequently, occasional mild wheezing continued throughout October. On November 20, he felt congestion in the chest and coughing increased. November 22, his temperature was  $100.4^{\circ}$ , but no abnormal chest findings were detected. Roentgenogram November 24 showed a wedge-shaped density in the left lower lung field with the apex directed laterally from the left heart border. Leucocyte count was 8,800 with 68 per cent neutrophils and 10 per cent eosinophiles.

In the spring of 1945, occasional mild wheezing occurred during the



FIGURE 5

FIGURE 6

Figure 5, Case 3 Dec 11, 1943 Dense infiltration in the left hilar region at level of second and third ribs anteriorly—Figure 6, Case 3 Mottled infiltration in the right apex Increased hilar density on each side Slight increased density in left mid-lung field

grass season On May 16, excessive dust exposure while unpacking dusty materials caused coughing and increased wheezing which required ephedrine for relief No subsequent symptoms were observed but on June 8, roentgenogram showed a new infiltration in the mid portion of the right lung, with considerable fibrosis still present in the upper left hilar region. Repeated sputum cultures on July 9 and August 3 were negative for tubercle bacilli and guinea pigs inoculated at this time were likewise negative when killed on September 14 Leucocyte counts on March 7, July 7, and August 22, 1945 were 12,500, 7,800, and 8,750 respectively with corresponding eosinophile count of 10, 13, and 12.5 per cent Sedimentation rates at one hour on these dates were 15 mm, 16 mm, and 2 mm, respectively

On September 15, 1945, chest examination was essentially negative Roentgenogram at this time showed a rather extensive infiltration involving the upper lobe on the right side Fibrosis in the left upper still remained, and there had been no change in appearance of the left hilus A sputum specimen at this time was again negative for acid-fast bacilli by concentration test, and by culture The leucocyte count on September 19 was 7,400 with 11.5 per cent eosinophiles Roentgenogram on January 16, 1946, showed essential clearing of the lesion in the left upper chest with only a minor amount of scarring in this area represented by a few fibrotic strands extending into the first interspace In the right lung, a fan-like infiltration extending from the hilus into the lower part of the right lobe still remained, but was less marked than in September The leukocyte count January 22 was 9,000 with 16.5 per cent eosinophiles On July 9, his general condition was good, the chest examination was normal, the leucocyte count was 6,050 with 0.5 per cent eosinophiles, and the sedimentation rate was 13 mm at one hour Sputum specimen at this time was negative for acid-fast organisms both by concentration test and cultures



FIGURE 7

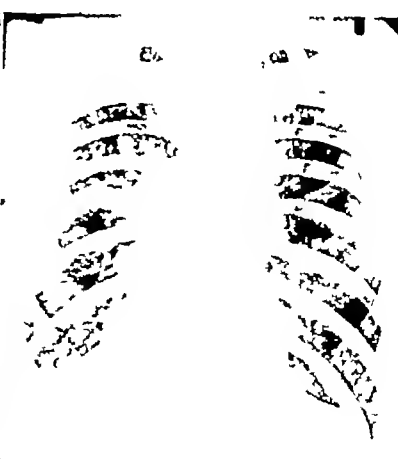


FIGURE 8

Figure 7, Case 3 Nov 24 1944 Apices clear Hilar densities increased Wedge shaped shadow in the left lower lung field.—Figure 8, Case 3 June 8 1945 Very marked clearing of right middle lobe Increased hilar markings remain, especially on the left

## COMMENT

Transitory pulmonary infiltrations conforming to Loeffler's criteria occurred in each of three patients reported. Multiple sensitivities to extrinsic inhalant allergens were demonstrated in each. In the first patient, repeated fulminating febrile episodes occurred without accompanying evidence of toxemia and with a recovery too prompt to be consistent with bacterial invasion. A transitory pulmonary infiltration was demonstrated by roentgenogram during one such episode. In both of the last two patients, bacterial sensitivities at times may have acted as the trigger mechanism for an allergic infiltration. The first recognized infiltration described in detail in Case II probably was initiated by such bacterial antigens, although no specific organisms could be incriminated. The later infiltration was accompanied by evidence of respiratory and urinary tract infection which may well have been responsible for the infiltrate. In the present state of our knowledge, control of such intrinsic or idiopathic factors is exceedingly difficult. In the third patient, it is apparent that extrinsic factors contribute materially to the clinical picture, and infiltrations often were related directly to massive exposure to such extrinsic allergens as dust, mold spores, or pollens. However, in view of the positive Mantoux test and of the single positive sputum reported, it is entirely possible that tuberculin may be an intrinsic antigen in this patient although clinical evidence of active tuberculosis continues to be lacking. The persistent and increasing fibrosis seen in the roentgenograms is adequate evidence that irreversible changes are developing in this patient which may well be of the type associated with hyperergic vascular damage such as described by Harkavy. Hyposensitization and avoidance of recognized extrinsic offenders has resulted in very definite general improvement and it is suggested that the irreversible process might well proceed with greater rapidity were it not for control of the recognized extrinsic sensitivities.

## SUMMARY

1 Three cases of Loeffler's syndrome are discussed. In each instance, atopic rhinitis and asthma were present and sensitivities to multiple inhalant allergens were demonstrated.

2 Presumably, polyvalent bacterial or intrinsic sensitivities were present in all three patients in addition to recognized extrinsic sensitivities. It is difficult and often impossible in the presence of multiple sensitivities to incriminate any single antigen as the cause of an episode of allergic pulmonary infiltration.

3 In two of the patients described, pulmonary infiltrations were

characteristically transitory In the third patient, although early infiltrations were of fleeting character, repeated attacks have left increasing residual fibrosis and evidence of irreversible damage It is believed that irreversible changes after allergic pulmonary infiltrations are especially apt to occur when so-called intrinsic or bacterial sensitivities are present

### RESUMEN

1 Se discuten tres casos del síndrome de Loeffler Todos ellos presentaban rinitis atópica y asma, y en cada uno se demostró sensibilidad a múltiples alérgenos de inhalación

2 Se supone que en todos los tres pacientes existían sensibilidades bacterianas polivalentes o intrínsecas, además de las sensibilidades extrínsecas reconocidas Cuando se presenta sensibilidad múltiple es difícil, y a menudo imposible, incriminar a un solo antígeno como causante de un episodio de infiltración pulmonar alérgica

3 En dos de los pacientes descritos las infiltraciones pulmonares fueron característicamente transitorias En el tercer paciente, aunque los infiltrados precoces fueron de un carácter efímero, repetidos ataques dejaron una creciente fibrosis residual y signos de daño irreversible Se cree que alteraciones irreversibles consecutivas a infiltrados pulmonares alérgicos tienden a ocurrir especialmente cuando existen las llamadas sensibilidades intrínsecas o bacterianas

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# Endothelioma (Mesothelioma) of the Pleura\*

(Presentation of a case treated surgically)

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Endothelioma of the pleura is a rare disease but even less common is the instance in which it is amenable to surgical extirpation. A case in which such a tumor was completely removed is to be presented in the following

Controversy exists as to the origin of these tumors. Klemperer and Rabin (1931), Banyai and Grill (1933), Stout and Murray (1942), and Saccone and Coblenz (1943) believe they arise exclusively from the endothelial lining of the pleura, Herxheimer and Reinke (1914), and Grossek (1932) believe they arise from the endothelium lining the pleural lymphatics, Frankel (1892), Aschoff (1936), and Ewing (1940) place the origin of these tumors in the pleural endothelium, Robertson (1924), and Willis (1938) state that these tumors are secondary to primary neoplasms elsewhere as within the lung and finally, Fischer (1931), and Scheidegger (1936) subscribe to the view that these tumors arise on the basis of aberrant rests of pulmonary epithelium within the pleura. Whatever their origin, it is generally agreed that they arise in the pleura and that the term "Mesothelioma" would be a more inclusive term. Saccone and Coblenz suggest the compromise term "Pleuroma" until such time when more is known about these tumors.

Until comparatively recent times, it was taught that all pleural endotheliomata have a multicentric origin in the pleura and that they grow diffusely. Recent studies by Klemperer and his co-workers and by Stout and Murray (1943) indicate that there are apparently two forms of such tumors. One grows diffusely along the pleura causing pleural thickening and invades the underlying tissue—lung, diaphragm, thoracic wall, etc., and either does not metastasize or involves the mediastinal lymph nodes. The second form is a circumscribed tumor which grows as a relatively benign process until late in the disease and then extends beyond its confines to the surrounding tissues. Stout and Murray state "one of these is distinctly of an epithelial appearance and consists of

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solid cords or hollow tubes of cells which sometimes seems to secrete a mucinous material. The other tissue assumes the appearance of a fibrosarcoma, spindle cells arranged in bundles, often with reticulin or collagen fibers between them. The epithelioid elements sometimes have suggested the hyperplastic proliferation of vascular endothelium when the cells assume a rounded or polygonal form, but more often seem truly epithelial with cuboidal or cylindrical cells arranged about lumens. The localized tumors, on the other hand, do not have the epithelioid elements but seem more like fibroma or fibrosarcoma."

Forty-three cases of endotheliomata of the pleura were collected from the literature in a series of 42,614 autopsies—a necropsy incidence of 0.10 per cent. At the Brussels St. Jean Hospital, Ley (1929) encountered nine cases in 2,000 autopsies—an incidence of 0.45 per cent, whereas Seydel (1910), at the Pathologic Institute of Munich, found but three cases in 10,829 necropsies, an incidence of 0.03 per cent. The disease occurs twice as frequently in males (146 cases) as in females (78 cases) and is about equally as frequent on the right side (59 cases) as on the left side (54 cases).

The subject of this report was a 54 year old Italian woman whose chief complaints were pain in the chest, asthenia and blood tinged sputum. About five years before the patient's admission to the Bushwick Hospital, she began to notice intermittent dull aches in the left infrascapular region. During the first two or three years the pains were not remarkable. For the next two years the pains became more constant but not



FIGURE 1

FIGURE 2

*Figure 1* Roentgenogram of the chest showing a well circumscribed mass in the left parahilar region—*Figure 2* Roentgenogram of the chest in the left oblique position revealing the posterior position of the neoplasm

necessarily more severe than previously About three years before her admission to the hospital, she noted that the pain was becoming more severe, especially during the winter months About the same time, she began to have cough with mucopurulent expectoration At times, the sputum was blood tinged—this was most common when the patient developed a "cold"

Physical examination revealed a well developed, apprehensive woman Except for the abnormal physical signs in the thorax, the physical examination revealed nothing unusual Except for a rapid rate, the heart too presented nothing abnormal The right lung was negative to percussion and auscultation The left hemithorax was dull to percussion over the middle posterior third Anteriorly, there was dullness to heavy percussion only, over the corresponding area In the area of impaired percussion (posteriorly) the breath sounds were distant and bronchial in character—at times there was a fleeting friction rub in the left scapular region

Laboratory studies revealed an essentially normal blood count and a normal blood sugar and protein level The Wasserman reaction was negative The electrocardiogram was interpreted as being within normal limits Roentgenographic examination of the chest revealed a solitary spherical mass about two inches in diameter, in the posterior mediastinal part of the left lung field suggestive of a benign new growth (Figures 1 and 2) Bronchoscopic examination about ten days before the patient entered this hospital failed to reveal any disease in either lung Preoperative diagnosis was benign tumor of the left lung

At the time of surgical intervention on May 9, 1946, there was found a large, well demarcated neoplasm between the two lobes on the left side As the two lobes were separated, a tumor arising from the left lower lobe was encountered The neoplasm was well circumscribed and appeared embedded in the upper posterior part of the dark, discolored lower lobe As the visceral pleura was split proximal to the tumor, it was noted that the part of the pleura over the tumor was thickened

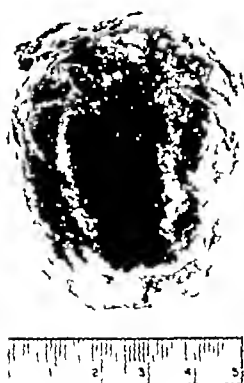


FIGURE 3



FIGURE 4

Figure 3 Tumor after its removal, measuring 5x4x4 cms—Figure 4 Tumor split open to show its consistency



FIGURE 5 Photomicrograph of one region of the neoplasm. Within the papillary structure of the stem there are several large, flat cells (180x)



FIGURE 6 Photomicrograph of another region of the neoplasm. The cells resemble the endothelium of a blood vessel (180x). The area delineated by the square is shown in Figure 7.



FIGURE 7 Photomicrograph of one part of the field shown in Figure 6 (850x)

and fused with the neoplasm. A proximal plain of cleavage was then developed and the tumor freed of the visceral pleura. It was then noted that the neoplasm was embedded in the lung but did not appear to take origin from the substance of the lung. At one point (about half inch in diameter), the tumor was fused to the lung tissue necessitating the removal of the adherent part of the lung (Figures 3 and 4).

The pathologist's report was as follows: The specimen consists of a well encapsulated tumor measuring 5x4x4 cm. On its outermost surface, there are strands of fibrous tissue. Just deep to this, there are many ecchymotic areas and thin vessels. On section, one notes a solid tumor which is composed of yellowish and hemorrhagic areas with a few dilated reddish areas at the periphery. Microscopic study of the tumor tissue (Figures 5, 6 and 7), showed a rather diffuse growth of papillary projections the outer layer of cells being of a low cuboidal character with large hyperchromatic nuclei. Within the fibrous stalk, there are a number of large irregular cells with multiple hyperchromatic and irregular nuclei. In other sections, there is a diffuse growth of polygonal shaped cells having a rather pale granular cytoplasm with vesicular nuclei. There are also present a number of vascular channels throughout the tumor varying in size from a small capillary-like structure to large blood channels lined by endothelium. In some sections, there are areas of hyalinization. The histologic picture suggests the probability of blood vessel origin.

Diagnosis: Angioendothelioma of the pleura.

### SUMMARY

A brief resumé of the subject of endothelioma of the pleura is presented with the report of a case in which surgical removal was carried out.

### RESUMEN

Se presenta un breve resumen sobre el tema del endotelioma de la pleura y se informa sobre un caso en el que se llevó a cabo la extirpación quirúrgica.

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# An Unusual Aortic Aneurism Followed for Ten Years

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Little new can be added to the knowledge of aneurism Galen knew external aneurisms well Lancisi, in 1728, wrote a monograph on their etiology Morgagni described the symptoms and morbid anatomy as early as 1761

There has come under our attention a most unusual case, which has been followed for a period of ten years Norris and Fetterolf<sup>1</sup> reported a similar case in 1917 Meerloo,<sup>2</sup> too, described a case in 1929, in which the aneurism eroded both the sternum and the vertebral column Any text book will describe erosions of the sternum complicating aneurism, but in this case, not only did the aneurism erode the sternum, but perforated it, and projected as a horny tumor on the anterior chest wall

L L was brought to the hospital February 7, 1936, at which time he complained of smothering spells edema of his extremities, productive cough, shortness of breath, worse at night, and ascites His pulse was 90, blood pressure 130/110 Examination showed his heart enlarged in all

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FIGURE 1



FIGURE 2

Figure 1 The appearance of the aneurism on September 20, 1945 at which time cornification of the skin had begun—Figure 2 The size of the horny growth can be appreciated as it is seen being held up by the patient Likewise in this illustration the aneurismal wall can be seen with the blood oozing from its surface This photograph was taken the day of the patient's death



diameters, and on auscultation there was a systolic murmur, which was faint in character, located at the base, transmitted down the left sternal border. The heart tones were weak, distant and muffled. The Wassermann test was 100 per cent positive, the EKG showed a left ventricular preponderance, the x-ray film showed the transverse diameter of the heart to be 18.5 cm, diameter of the aorta 9.8 cm. Fluoroscopic examination of the chest showed a pulsating, saccular tumor at the arch of the aorta, and the diagnosis of aneurysm was made. There was a history of penile sore in 1909. He was treated with bed rest, digitalis and salyrgan, and after compensation was established he was given antiluetic treatment, consisting of potassium iodide and mercury, and a course of bismuth. After 102 days in the hospital he was discharged considerably improved.

Four and a half years later he returned to the hospital, on September 4, 1940. He was complaining of soreness in chest, aching in back, smothering spells and weakness. The soreness in his chest, which he had been having for fifteen years, he stated was gradually getting worse. His cardiac diameter was now measured at 19.5 cm. On this admission his blood pressure was 150/85, and the aorta now measured 10.5 cm. A diastolic murmur had appeared at the base. His Wassermann test had become negative, and he was given a diagnosis of aortic insufficiency.

After twenty-seven days he was again discharged as improved, and was admitted for the third time on February 4, 1945. At this time he complained of shortness of breath and swelling of the lower extremities. The x-ray film showed the transverse cardiac measurements to be 22.5 cm, his EKG showed many ectopic beats, widening of the QRS, suggesting left bundle branch block. Examination showed an expansile

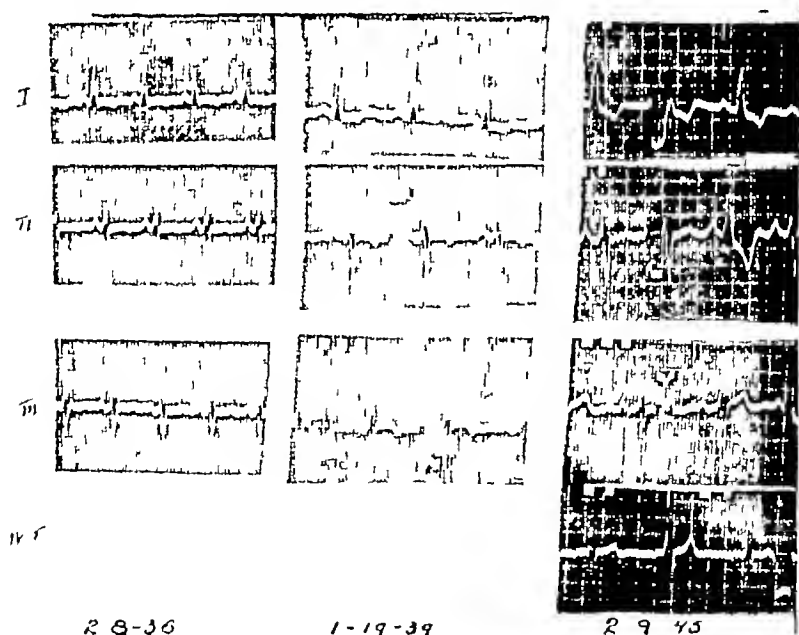


FIGURE 3 Electrocardiograms taken on February 8 1936 on January 19, 1939 and February 9 1945

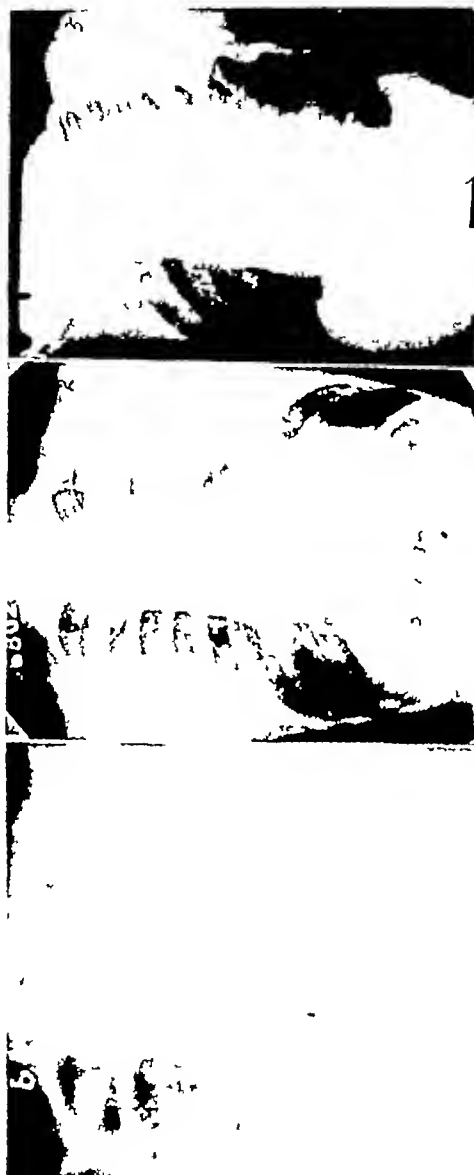


FIGURE 4

FIGURE 5

FIGURE 6

Figure 4 Shows the appearance of the chest on his first admission when the diagnosis of aneurism and cardiac failure was first made—Figure 5 Shows six weeks later, when his compensation was established and his passive congestion had fairly cleared up—Figure 6 Left oblique shows erosion through the sternum

mass, measuring 8 cm in length and 6 cm across its base, protruding upward and outward, to the right of the upper part of the sternum

After four months he was again discharged as improved. However, he was admitted again on August 9, 1945, his final admission. He had again developed swelling of his legs and shortness of breath. He became compensated after three days of treatment, and was ambulant and comfortable until March 20, 1946, when the aneurism ruptured and the patient expired.

Three days prior to the patient's death, the horn projecting from his sternum dropped off, and the aneurism could be seen pulsating and oozing blood from its wall.

### SUMMARY

An unusual appearing aneurism is presented, together with a ten year study. It is offered only as unusual and an interesting case.

We are indebted to Mr. Charles Edwards of the X-Ray Department for the photography.

### RESUMEN

Se presenta un aneurisma de raro aspecto, junto con un estudio de diez años. Se ofrece este caso solamente como raro e interesante.

Le agradecemos la fotografía al Sr. Charles Edwards del Departamento Radiológico.

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FIGURE 7



FIGURE 8

Figure 7 Shows the appearance on his last admission. The aneurism may be seen coming through the sternum and projecting up under the skin.—Figure 8 Shows left oblique showing left heart enlargement and the perforation of the sternum at the time of his last admission.

# Thoracoscopy and Pneumonolysis\*

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In 1934, Moore<sup>1</sup> reviewed the literature on closed intrapleural pneumonolysis and published the results in a collected series of 2,114 cases. In 1944, Goorwitch<sup>2</sup> in an exhaustive study analyzed the results and complications of the operation in forty-eight of his own patients, as well as in operations on 5,114 patients published by various authors in the literature from 1933 to 1943. These two series, representing two successive decades, are remarkably similar in essential results and complications. There are some operators in each group whose results are so good that their analytical judgment is open to question. For instance, the incidence of postoperative pleural effusion ranged from 3 to 25.5 per cent. One operator reported 13 per cent of postoperative empyemas but only 1.3 per cent of bronchopleural fistulae. Others have an unusually high percentage of complications but have doubtless salvaged a number of unsuccessful pneumothoraces by attacking adhesions their more conservative colleagues have avoided.

The present trend toward early abandonment of an unsuccessful pneumothorax has made thoracoscopy almost a mandatory procedure in a substantial percentage of cases. Nearly all operators agree that only by thoracoscopy can an accurate determination as to the possibilities of severing adhesions be made. By thoracoscopy also much other information of value in determining the adequacy of the pneumothorax can be obtained. The presence or absence of subpleural tubercles, of blebs and bullae, and the degree of inflammatory pleural reaction are all matters that may be weighed before a final decision as to maintenance of the pneumothorax can be made.

It is my feeling that thoracoscopy should be used more frequently than at present, since it is a relatively simple procedure with few complications, and yields high dividends in essential information.

Pneumonolysis, on the other hand, is a highly technical and potentially dangerous procedure which has too often resulted in disaster to the patient through the operators' zeal to improve an

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unsuccessful pneumothorax Since we now have in phrenic nerve operations combined with pneumoperitoneum, and in thoracoplasty, two safe and successful methods of treatment, it behooves the operator to "stop-look-and consider" the possibility of empyema and bronchopleural fistula before attempting to free a border line type of adhesion In any event, the operation should not be performed, unless facilities and personnel are available for an open thoracotomy, if hemorrhage should make it necessary

Pneumoperitoneum has gained such an ascendancy over pneumothorax at the Oteen Veterans Administration Hospital in the past eighteen months that we are being called upon less frequently to perform a pneumonolysis

Our attitude has been conservative as to pneumonolysis, but enthusiastic as to thoracoscopy After intrapleural visualization, we have doubtless considered inoperable many adhesions, which bolder souls would attack without hesitation The favorable results obtained here with pneumoperitoneum and our success with thoracoplasty, however, have tipped the scales toward conservatism in many questionable adhesions

From July 1943 to July 1946, we have done 234 thorascopies on 224 patients On 88 of these patients, 96 pneumonolyses were performed This represents an operability rate of 41 per cent

The thorascopies have been singularly free of complications In a few cases, a transient elevation of temperature or accumulation of serous pleural fluid occurred One case developed a temporary bronchopleural fistula, the consequent pneumothorax had to be decompressed and the lung reexpanded His disease subsequently attained an arrest One case developed a tuberculous empyema, and died three months postoperatively It is probable that in any 224 pneumothoraces without thoracoscopy, an equal number of complications would have been encountered

In 48 operations, or 50 per cent of the total number of pneumonolyses, a complete division of all the adhesions visualized was performed In 23 operations, or 24 per cent, an incomplete division was done By this it is meant that one or more adhesions were completely divided but that some adhesions remained which it was not considered possible to divide In 25 operations, or 26 per cent, there was a partial pneumonolysis, one or more adhesions being partially severed but for reasons of safety, or bleeding, it was felt dangerous to attempt to complete the division

Following 38 operations, or 39 per cent of the group of 96 pneumonolyses, the sputum remained positive In 17 of these patients, however, there was sufficient contralateral disease to account for the positive sputum Twenty-nine per cent were negative before the operation and remained negative In 36 operations, that is in

40 per cent of the 88 patients, the sputum was converted from positive to negative. Thus, in 69 per cent of these operations a negative sputum was either present initially or resulted from the lysis.

The double puncture technique with the electrocautery was used routinely. The complications encountered were as follows:

1) Hemorrhage, 5 per cent. In two cases the hemorrhage was of only moderate extent and resulted in no morbidity. In three cases there was bleeding of 500 cc or more. In one young colored male with a rather broad adhesion, a large vessel, presumably an intercostal, was injured so that there was a flow of blood which arched in a crescent half way across the pleural cavity. The base of the parietal attachment of the adhesion was cauterized and the bleeding diminished but did not cease. An immediate thoracotomy was performed and the operation completed as an open pneumonolysis. This patient did well following the operation and subsequently his sputum was converted. The second case with a hemorrhage of over 500 cc did not bleed at the operation. A thoracentesis was done the next day for fluid and blood obtained. A thoracoscopy was done and the point of division of the adhesion visualized. No active bleeding was present. He recovered uneventfully following two more thoracenteses. The third case was one of the patients who died and he will be discussed under a subsequent heading.

2) Purulent effusion occurred in two operations, or 2 per cent of the cases. One of these was a mixed empyema and one of pure tuberculous type. Both of these patients died some time after the operation. They will be discussed in detail later.

3) Fever of over 100 degrees followed 29 operations, or 30 per cent of the procedures. This fever persisted over an average of six days postoperatively. In 21 operations, or 22 per cent, fluid either increased or a fresh accumulation appeared subsequent to the pneumonolyses. These were serous accumulations of a transient nature and resulted in no morbidity.

4) Bronchopleural fistulae were present in 2 per cent, or followed the operations.

5) Deaths. Four patients died in the 308 days following operation. Two of these were not attributable to pneumonolysis. One died with a mediastinal abscess subsequent to a bronchoscopic accident, and one died of a massive hemorrhage from a contralateral hilar cavity six months subsequent to the pneumonolysis. The death of two patients, 2 per cent of the operations, were attributable to pneumonolysis. One white male, age 48, had a pneumonolysis with a long band adhesion divided at the chest wall on August 4, 1943. His temperature was elevated the first

postoperative day to 102.6 degrees and remained over 100 degrees for sixty days. The temperature then ranged from 98 degrees to 99.6 degrees until December 1, 1943, when it became elevated to 102 degrees and showed a daily elevation thereafter until his death on January 7, 1944, five months after the operation. At the time of the pneumonolysis, 800 cc of turbid, amber fluid was withdrawn through a catheter inserted in the thorax. August 17, 1943, 550 cc of thin, green fluid was removed. From 200 to 500 cc of thin, light green fluid was removed at weekly intervals up until the time of his death. On August 4, 1943, the fluid was negative for acid-fast bacilli and pyogenic organisms. On August 16, 1943, acid-fast bacilli were present. September 14, 1943, acid-fast bacilli and staphylococci were demonstrated. While this death occurred five months postoperatively and while pus was not actually demonstrated, the presence of tubercle bacilli and staphylococci in the fluid indicated that a mixed infection was present and the death must be attributed to the operation. Actually the presence of turbid, amber fluid at the time of the operation would cast some doubt as to whether or not this chain of events might not have occurred even without the operation. The second death attributable to the operation was that of a 27 year old white male who had partial pneumonolysis on July 25, 1944. His temperature was elevated to over 100 degrees from the first postoperative day until the time of death. The first day postoperatively, a positive pressure was found in the pneumothorax space. On three occasions from July 25 to September 2, the date of his death, sanguineous fluid was removed from the pleural cavity. A contralateral cavity appeared. This death must also be attributed to the operation due to the fact that the positive intrapleural pressure the first day postoperatively indicated the presence of a bronchopleural fistula. Sanguineous fluid removed on three occasions also indicated that hemorrhage of more than moderate degree had occurred.

### SUMMARY AND CONCLUSIONS

1 In a series of 234 thoracoscopies from 1943 to 1946, ninety-six pneumonolyses were performed.

2 Thoracoscopy has proved to be a safe, simple and informative procedure, singularly devoid of serious complications.

3 Sixty-nine per cent of the pneumonolysis operations resulted in a negative sputum or made possible the continuation of a pneumothorax in a previously negative case.

4 The serious complications following the 96 pneumonolyses were Hemorrhage, 5 per cent, Empyema, 2 per cent, Death, 2 per cent.

## THORACOSCOPY AND PNEUMONOLYSIS

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5 These results are in general agreement with the averages of the series of Moore and Goorwitch, but at variance with some of the individual authors of those series

## RESUMEN Y CONCLUSIONES

1 En una serie de 234 torascopias llevadas a cabo de 1943 a 1946, se ejecutaron noventa y seis neumonolisis

2 Se ha comprobado que la torascopia es un procedimiento inofensivo, sencillo e informativo, particularmente exento de complicaciones graves

3 El sesenta y nueve por ciento de las operaciones de neumonolisis dieron como resultado un esputo negativo o permitieron la continuación del neumotórax en casos previamente negativos

4 Las complicaciones graves que siguieron a las 96 neumonolisis fueron Hemorragia, 5 por ciento, Emplema, 2 por ciento, Muerte, 2 por ciento

5 Estos resultados están generalmente de acuerdo con los procedimientos de las series de Moore y Goorwitch, pero están discordes con algunos de los autores individuales de esas series

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# Unilobar Tuberculosis Treated by Lobectomy

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The surgical treatment of various diseases of the chest is making rapid strides. The techniques involved are contributing to a greatly decreased mortality rate from chest diseases. The lessening of the operative risk stimulated the authors to study the further extension of surgical treatment in pulmonary tuberculosis. This study was initiated somewhat over a year ago and is reported in this article. The premise advanced is that lobectomy possibly may have a place in the treatment of some unilateral tuberculous lesions, as a means of eradicating the tuberculous focus for individual cure of the disease. The various comments of authorities prominent in the field of tuberculosis concerning lobectomy are familiar to the authors. Most of the arguments cited are against such a procedure. However, the authors felt, and hoped, that the operative risk of lobectomy had decreased to the point where a guarded trial of such a procedure was justified. We are happy to say that our hopes were justified and we feel that in no case has our surgical treatment harmed the patient. In fact, although our series of lobectomies is small and not statistically of value, we feel that definite patient improvement, rehabilitation, and perhaps cure or arrest of the tuberculosis has resulted in every instance. It is admitted that this must be a preliminary report, as the time elapsed following operation—about one and a half years—is not sufficient without further follow-up study for final evaluation. The results so far, however, are quite striking. This consecutive series of five cases is reported for its face value.

## *Classification of Lesions*

In a recent article<sup>1</sup> the minimal lesion was divided into several groups on a basis of study of 469 such lesions. These groups are as follows:

**Exudative Group** Those showing pneumonic infiltration, but without progression to cavitation.

**Exudative-Productive Group** In this group there were exudative

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and productive processes associated with organization and healing, but the lesions were considered unstable

In the above two groups progression of the lesion occurred in 33 per cent of white patients and in 49 per cent of non-white patients within one year, and in 49 per cent of the white and 61 per cent of the non-white patients within five years

**Productive-Fibrotic Group** Those showing foci consisting of either tuberculous granulations or fibrosis, or both

**Fibro-Calcific Group** Those showing calcareous or cheesy calcareous foci with advanced anatomical healing

In the last two groups above, the five year incidence of progression of the diseases was 5 per cent for white patients and 14 per cent for non-white patients In the cases showing progression, most of the patients were stated to have advanced or far advanced disease

The effect of conservative therapy in treatment of minimal tuberculous lesions is difficult to evaluate There are no definite data available for evaluation, because of the marked variants that occur—selection of cases, selection of treatment, lack of uniformity of institutional care, differences within the series of cases themselves, such as percentages of the different types of minimal lesions, racial differences and other factors In the previously mentioned 469 cases the progression of disease was found in 33 per cent of white patients and in 49 per cent of non-white patients Other series reported are lower<sup>2</sup> These authors report a rate of progression for 33 per cent of all patients

In the selection of cases for lobectomy, the distinction between lesions likely to progress and those not likely to progress can be made if the character and progressive tendencies of the minimal lesions to be considered are kept in mind

The unilobar lesion is differentiated from the minimal lesion by anatomical location A unilobar lesion must be limited to one side It may be a minimal lesion It may show progression by the development of cavitation or local spread

**Selection of Cases for Lobectomy** Most cases of minimal tuberculosis selected for lobectomy today show bronchial ulceration and stenosis, atelectasis, bronchiectasis, other complications, or are those that have failed to respond to previous surgical methods This places a heavy responsibility on lobectomy That such a procedure has been able to retain favor under these circumstances is, in itself, a certain commendation A fair trial as compared to conservative therapy would consist of its application in cases without complications The series of cases herein reported falls into the latter group We have not operated upon minimal lesions *per se*, but we selected for lobectomy five unilobar lesions with evidence

of cavitation As a group the cases showed definite evidence of progression rather than healing We eliminated cases with bronchoscopic evidence of stenosis or ulceration We felt that the complete eradication of the focus of infection was not possible in such cases

*Criteria for the Selection of Cases* (1) The tuberculous lesion must be unilobar (limited to one lobe and not evidenced elsewhere) This determination is difficult and cannot be accomplished in all cases However, if all diagnostic studies indicated that only one lobe were involved, it is felt that the percentage of error would be very small In a case not included in this series, an exploratory thoracotomy was done because of what appeared to be a tuberculous involvement of the left upper lobe with markedly enlarged hilar lymph node, possibly lymphoma or carcinoma At operation the lesion of the upper lobe was found to be tuberculous and a caseous nodule about  $1\frac{1}{2}$  to 2 cm in diameter was found in the medial portion of the apex of the lower lobe The upper lobe was removed The nodule broke down following complete expansion of the lower lobe and formed a cavity which now has a thick wall The patient's sputum is negative and no spread had occurred in the lower lobe, so apparently the removal of the upper lobe did no harm This case is not included in this reported series, because at the time of operation the lesion was recognized as not being unilobar Eighteen months postoperatively, this patient feels well and has gained in weight The sputum is negative

(2) The second criterion for lobectomy is evidence of lesion progression under conservative therapy, such as cavitation, local spread or hemorrhage

(3) There must be no bronchial ulceration or tuberculous granulations In the series reported an attempt was made to eradicate all evidence of tuberculosis Bronchial ulceration or extension usually means that the surgical incision (of the bronchus) extends through or leaves some definite tuberculous tissue behind

(4) The candidate for lobectomy should not be over forty years of age This requirement reduces the operative risk It may be that this is not necessary as long as the patient is otherwise in good condition There is, of course, an operative risk with any procedure, but if the risk can be kept low, perhaps by limiting the procedure to a lower age limit, it may be considered justified

*Principles Involved in the Procedure* (1) It is realized that pulmonary tuberculosis, while localized in the lungs, is a systemic disease in that it has general systemic reactions These reactions may be revealed by change in the blood count, sedimentation time, spread of disease to other organs, etc Such reactions are true of other diseases and the removal of all of the evident foci of infec-

tion of disease is advocated and carried out in many conditions. This same principle can be applied to certain types of tuberculosis. In a good many diseases, the elimination of the major focus of infection of disease allows the body to overcome the residual disease. With lobectomy, the time necessary for cure or arrest of tuberculosis may be greatly reduced. Most of our lobectomy patients are permitted to be up from seven to twelve days postoperatively, but they are maintained for three months on a regime of regulated rest, exercise and diet, similar to that carried out for cases treated conservatively. The first case in our series was an overly enthusiastic patient who, in spite of instructions, frequently would be found playing baseball and indulging in other athletics. He started this about the third or fourth week postoperatively. His course has been excellent, however, and at the present time (two years postoperatively), he shows no evidence of tuberculosis. There is no deformity or impaired physical power and the patient feels well. There is no pain or dyspnea and there is no deformity or muscular weakness, as sometimes occurs with thoracoplasty.

(3) We would like to put forward the premise that lobectomy does not entail any greater risk of complications or spread of disease than do conservative methods of therapy. With pneumothorax the complications that occur are infection, empyema, air embolism and bronchial obstruction. Reactivation of the lesion following reexpansion of the lung occurs in a number of instances. Frequently, adhesions prevent adequate collapse and pneumonolysis with its added hazard, is necessary. The danger of complications following lobectomy is no greater and, actually, appears to be less. The risk of spread to the other lung due to compensatory overactivity of the contralateral lung would not appear to be greater with lobectomy than with pneumothorax or other procedures. The slight overexpansion of the remaining lung on the operated side in lobectomy may increase the possibility of activation of any remaining or overlooked lesion. A phrenic interruption at the time of operation may decrease this hazard. Careful examination of the chest to rule out involvement of any other portion of the lung will guard against such activation. In the one case mentioned previously, in which the lower lobe was involved, there was no spread or extension of the disease postoperatively. Pneumothorax and thoracoplasty do not remove the tuberculous lesion. Instead, it is relaxed so that extension of the process is possible and does occur postoperatively in a percentage of cases.

(4) Another important factor in selection of patients for lobectomy is the degree of operative risk and mortality involved. In a group of cases chosen according to the criteria listed previously,



FIGURE 1

FIGURE 2

FIGURE 3

Figure 1, Case 1 Preoperative chest film —Figure 2, Case 1 Immediate postoperative film —Figure 3, Case 1 Follow-up film

the mortality rate should be very low, and this will be the case if the patients are in experienced hands. Even for cases complicated with bronchiectasis, the mortality rate reported in a large series of cases is as low as three per cent or less. In the series reported here there were no fatalities, although the series is small. This is approaching the mortality rate in thoracoplasty.

### CASE REPORTS

*Case I* C S, a 25 year old white male was admitted to the Medical Center on October 7, 1944. During a tuberculosis survey in September 1944 a minimal tuberculous lesion was found involving the left upper lobe. Subsequently, an infiltrative lesion developed at the level of the first interspace, with an area of rarefaction suggestive of a small cavity. Artificial pneumothorax was begun at the referring institution. Physical examination on admission to this hospital revealed a well developed and fairly well nourished adult white male in no apparent distress. The chest was clear to auscultation and percussion. No rales were elicited. Urinalysis was essentially negative on admission. RBC, 6,430,000, Hgb, 16.4 gms, WBC, 8,550, with a normal differential count. A standard film of the chest on admission revealed a beginning collapse of the left lung with a small amount of fluid at the left base. The right lung and the left lower lobe were normal in appearance. Sputum examinations were consistently negative. A gastric washing on December 7, 1944 was negative for tubercle bacilli. Blood sedimentation rate was 7 mm per hour (Cutler) on October 12, 1944 and 6 mm on January 8, 1945. The patient received routine tuberculosis care and pneumothorax refills. A good collapse of the left lung was demonstrated on a film taken December 14, 1944. He began expectorating blood-streaked sputum on November 16, 1944. Hemoptysis continued from that date until November 23rd. A moderately severe hemorrhage occurred on November 17th. Hemoptysis recurred on December 11, 1944 and continued in varying amounts until January 5, 1945.

On January 10, 1945 a left upper lobe lobectomy was performed under intratracheal ether and oxygen anesthesia. At the time of operation the

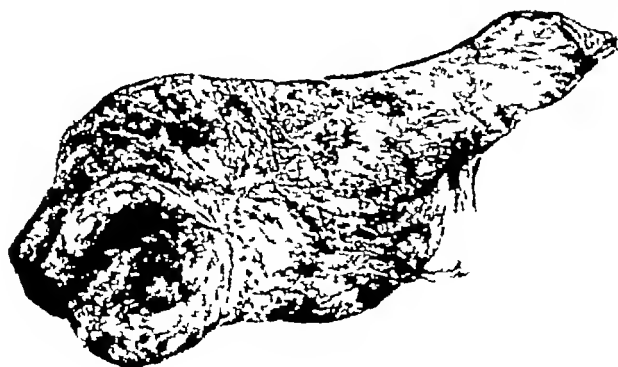


FIGURE 4 Case 1 Gross specimen

apex of the upper lobe was found to be attached to the parietal pleura by a broad adhesive band which contained lung parenchyma. Several miliary spots were present on the visceral pleura at the apex. Several firm, indurated areas were palpated within the lung. The pathological examination revealed tuberculosis of the left upper lobe with several areas of caseation and multiple foci of the disease throughout the lobe. The postoperative course was entirely uneventful. The patient was returned to the tuberculosis service on January 25, 1945 for further observation. The operative wounds were completely healed. He had no further complaints referable to his chest. Sputum examinations have remained negative. On August 6, 1945 the patient was transferred to another institution. Re-check x-ray films July 1946, show no evidence of tuberculosis. Blood sedimentation rate was 5 mm per hour (Culter) on July 8, 1946. Gastric washing on the same date was negative for acid-fast bacilli.

*Case II* H W, 28 year old white adult male, was admitted to the Medical Center on April 16, 1944 with a diagnosis of pulmonary tuberculosis. He gave a history of having had pneumonia in 1941. Shortly thereafter a diagnosis of tuberculosis was confirmed. He received sanatorium care for a period of nine months in 1942. He was hospitalized in Atlanta in October, 1943 until his transfer to this hospital. While at Atlanta, he had a severe pulmonary hemorrhage in November 1943. Physical examination on admission revealed a well developed and well nourished adult white male. His weight was 186 pounds and his height 67 inches. The chest was essentially negative to auscultation and percussion. No rales were elicited. A standard film of the chest revealed the heart to be pulled somewhat into the left hemithorax. The diaphragm was smooth and the costophrenic angles clear. There was a tuberculous process corresponding to the left first, second and third interspaces anteriorly. There were drainage lines extending from these opacities to the hilus. The right



FIGURE 5

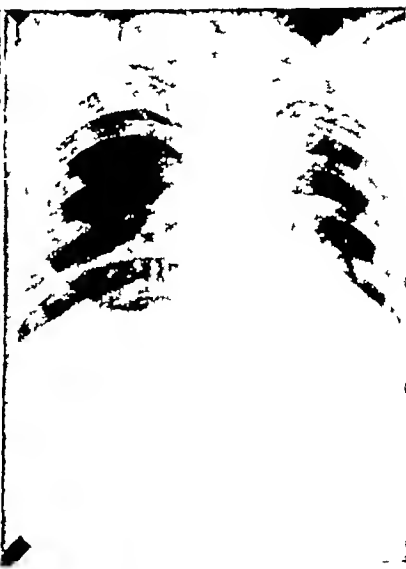


FIGURE 6

*Figure 5* Case 2 Preoperative chest film—*Figure 6*, Case 2 Follow-up film

lung was normal in appearance Urinalysis on admission was essentially negative Examination of the blood showed RBC, 5,680,000, WBC, 7,750, Hgb, 16.4 gm, normal differential count Blood sedimentation rate was 16 mm per hour (Cutler) Kolmer and Kahn tests were negative Sputum examinations were reported as negative for tubercle bacilli on April 22, 1944 and on May 15, 1944 A re-check x-ray film of the chest on July 10, 1944 showed renewed activity in the lesions previously described and, in addition, there was the appearance of a cavity at the level of the second interspace on the left Sputum examinations were positive for tubercle bacilli on July 6, 1944 Artificial pneumothorax was begun on July 22, 1944 A film on July 29th demonstrated beginning collapse of the left upper lobe with the cavity slightly smaller and there was an adhesion demonstrated at the level of the second interspace A film on October 14, 1944 revealed a poor pneumothorax with a small amount of air present The cavity remained patent There was an adhesion shown opposite the hilus and there were no doubt many adhesions preventing the collapse of the lung The sputum remained positive in October 1944 An x-ray film on January 5, 1945 showed a better collapse of the lung however, two cavities were now discernible which were not collapsed in spite of a good pneumothorax The sputum remained positive in January and February A re-check film on April 5, 1945 revealed a good collapse of the left lung, but the cavities were still apparent There was no pleural effusion present The right lung showed no evidence of tuberculosis The patient received a total of 38 pneumothorax refills from July 22, 1944 to May 7, 1945

On May 15, 1945 a left upper lobe lobectomy was performed The pathological examination revealed tuberculosis of the left upper lobe, with a cavity  $1\frac{1}{2}$  cm in diameter and four circumscribed white areas of necrosis in the medial portion No change was noted in the peribronchial lymph nodes The patient made an uneventful postoperative recovery and was returned to the tuberculosis service on June 2, 1945 for further observation An x-ray film on January 8, 1946 revealed thickened pleura in the left apex The right lung had escaped the disease, as had the lower portion of the left lung The left hemidiaphragm was high There was no evidence of tuberculous disease Blood sedimentation rate was 6 mm per hour (Cutler) on January 22 1946 Sputum examinations postoperatively have been consistently negative for tubercle bacilli Gastric washing on January 27, 1946, however, was reported as being positive The patient has no symptoms referable to his chest He has remained afebrile The patient's weight on February 10, 1946 was 191 pounds Frequent sputum examinations in April 1946 have been consistently negative for tubercle bacilli

*Case III* O S, a 33 year old negro adult male was admitted to the Medical Center on April 16, 1944 as a transfer from Atlanta with a diagnosis of pulmonary tuberculosis On admission, the patient stated that in June 1943 he developed a productive cough, his sputum was blood-streaked and he began losing weight, the latter amounting to 13 pounds in a period of approximately four months A few months later, he began having night sweats and sharp stabbing pains in the left lower chest which were aggravated by inspiratory efforts He stated that his sputum was found to be positive for acid-fast bacilli in March 1944 while at the referring institution The patient's weight on admission was 144 pounds and his height was 64 inches Examination of the chest revealed dry,



crackling posttussic rales in the left apex to the fifth rib posteriorly and in the left supraclavicular region. There were dry rales occurring in the middle of inspiration in both bases anteriorly. Urinalysis was essentially negative, RBC was 4,950,000 with 15.9 gm of hemoglobin, the white cell count was 7,400, differential neutrophils, 60, small lymphocytes, 22, large lymphocytes, 8, stabforms, 8, eosinophiles, 2 per cent. X-ray examination of the chest on admission revealed the heart and trachea to be pulled into the left hemithorax. The left apex was fairly clear. Corresponding to the second, third and fourth interspaces on the left, there was a large, soft density which represented an active infiltration. There were two areas of lessened density in this shadow which were suggestive of small cavities. Behind the third rib on the right, there was a soft density which represented a probable spread of the tuberculous disease from the left lung. Sputum examinations were negative for tubercle bacilli on April 22 and May 15, 1944. Blood sedimentation rate was 17 mm in 60 minutes (Cutler). A re-check film on July 1, 1944 showed no evidence of spread of the disease. There was no definite evidence of cavitation. Sputum was positive on July 28, 1944. A film on October 13, 1944 showed no evidence of activity in the right lung. Small cavities were discerned in the left lung. Artificial pneumothorax was begun on the left side on October 30, 1944. A film on January 5, 1945 showed numerous adhesions in the left apex which were preventing a collapse of the upper lobe. There was no evidence of pleural effusion. Bronchoscopy was performed on May 4, 1945. There was some thickening of the carina. No mucous membrane irritation or ulceration was seen. There was no exudate or drainage from the bronchi on either side. Smears taken from the bronchi were negative for acid-fast bacilli.

A left upper lobe lobectomy was performed on July 3, 1945. The patient's left upper lobe was entirely adherent to the parietal pleura in the region



FIGURE 7



FIGURE 8

*Figure 7 Case 3 Preoperative chest film—Figure 8 Case 3 Results with pneumothorax*

of the mediastinum, apex, lateral wall and posteriorly, the only free portion being anteriorly. The left upper lobe was freed from its attachment to the parietal pleura with some difficulty and it was necessary to remove portions of the pleura of the chest wall along with part of the lung in certain areas. There was also a band-like adhesion from the lingula to the pericardium. Microscopic tissue examination revealed many nodular and caseous foci of tuberculosis throughout the left upper lobe and lingula. The postoperative course was essentially uneventful. X-ray examination of the chest on January 8, 1946 and June 3, 1946 showed the heart and mediastinum to be shifted into the left hemithorax. The greater portion of the left lung field was obscured by thickened pleura.



FIGURE 9



FIGURE 10

*Fig 9, Case 3* Immediate postoperative film — *Fig 10, Case 3* Follow-up film



FIGURE 11 Case 3 Gross specimen



FIGURE 12

FIGURE 13

FIGURE 14

Figure 12, Case 4 Preoperative chest film—Figure 13, Case 4 Immediate postoperative film—Figure 14, Case 4 Follow-up film

However, the left lung showed increased aeration as compared to a film taken on August 21, 1945. The right lung showed no evidence of tuberculous disease. The patient's admission weight was 144 pounds. Prior to operation the patient had a gradual weight loss. On July 1, 1945, two days preoperatively, his weight was 121 pounds. Thirteen days following lobectomy he weighed 114 pounds.

The sputum was negative on January 29, 1946. A guinea pig was inoculated with gastric washings on February 11, 1946. Necropsy of the animal on May 6, 1946 revealed no evidence of tuberculosis. Sputum examinations by the concentration method were negative on June 3, 1946 and July 17, 1946. Examination of a gastric washing on July 8, 1946 was negative for acid-fast bacilli. The patient weighed 122 pounds on July 14, 1946. He is afebrile and has no complaints referable to his chest.

*Case IV F J W* a 34 year old white adult male, was admitted to the Medical Center on May 5, 1945. In March of 1944, the patient volunteered to be infected with malaria at Atlanta. Prior to the project, a routine roentgenogram was made of his chest and tuberculosis involving the right lung was discovered. In February 1945 the patient began having dull pain in his right chest which was aggravated by respiratory efforts. He also had night sweats and a nonproductive cough. Weight loss was quite marked from 156 to 138 pounds during the three-month period prior to admission to this hospital. Physical examination on admission revealed the patient to be a fairly well developed and nourished adult male, age 34, in no apparent distress. His height was 70 $\frac{3}{4}$  inches and his weight was 139 pounds. The chest was essentially negative on auscultation and percussion. No rales were elicited. The heart was normal and blood pressure was 126/74. There was a right rectus healed scar. X-ray examination on admission revealed the right apex to be filled with soft shadows down to the third interspace. There was the appearance of two small cavities at the level of the third interspace. A calcified primary lesion was present at the level of the second interspace on the left with calcified lymph nodes shown in the left hilar area. The disease on the right was thought to be active and probably progressing. Lamino-graph studies of the chest on May 14, 1945 revealed two moderate sized cavities beneath the third and fourth ribs posteriorly. No active disease was visualized in the lower right or in the left lung fields. Artificial pneumothorax was begun on May 21, 1945. On June 17, 1945, the patient began having moderate pulmonary hemorrhages, which continued for two days, and recurred on June 23, 1945. He continued to have moderate hemoptysis off and on until the time of operation. Sputum examinations were positive for tubercle bacilli on admission.

On July 5, 1945, a right upper lobe lobectomy was performed. At the time of operation, the right upper lobe was nodular in consistency and was adherent to the chest wall in its apical and medial portions. The right middle and lower lobes appeared to be free of disease, with the exception of the hilar portion of the middle lobe in which one moderate size calcified gland could be palpated. Microscopic tissue examination revealed a diffuse tuberculous involvement of the right upper lobe with several areas of cavitation. The postoperative course was essentially uneventful. The patient was returned to the tuberculosis service on July 18, 1945 for further observation. Periodic x-ray examinations of the chest postoperatively have shown the right lung to be completely expanded with no evidence of any parenchymal disease. The calcified area in the



FIGURE 15

FIGURE 16

FIGURE 17

Figure 15, Case 5 Preoperative chest film —Figure 16, Case 5 Immediate postoperative film —Figure 17, Case 5 Follow-up film

left lung has shown no evidence of activity The blood sedimentation rate three weeks postoperatively was 22 mm in one hour (Cutler) This rate had dropped to 2 mm on October 15, 1945 and was 3 mm on January 22, 1946 Sputum examinations and gastric washings have remained negative following operation A guinea pig was inoculated with gastric washings on March 28, 1946 Necropsy of the animal on May 6, 1946 revealed no evidence of tuberculous involvement On July 17, 1946, sputum examinations were negative The patient has remained afebrile postoperatively The patient weighed 139 pounds on admission His weight on February 10, 1946 was 150 pounds, a weight gain of eleven pounds during hospitalization

Case V D L A., a 31 year old white adult male, was admitted to the Medical Center from Atlanta on May 18, 1944 On admission, the patient gave a history of chest pain, gradual weight loss, productive cough and intermittent hemoptysis which began in February 1943 He was admitted to an Army General Hospital in California on May 27, 1943 for observation and treatment X-ray examination of the chest at that time revealed moderately advanced pulmonary tuberculosis involving the upper lobe of both lungs Sputum was positive for tubercle bacilli The patient was subsequently admitted to Atlanta on October 30, 1943 X-ray examination at the time showed some infiltration in the right apex There was no other evidence of active tuberculous disease Sputum examinations were negative during the period of hospitalization at Atlanta On admission to the Medical Center, chest roentgenograms revealed the hilar shadows to be somewhat increased and there were several calcified lymph nodes on the right Sputum examinations were negative and the blood sedimentation rate was 4 mm in one hour (Cutler) The patient remained under observation for a period of one year On May 21, 1945 the patient complained of pleuritic pain in the right chest and had an elevation of temperature X-ray examination revealed tuberculous infiltration with exudation and probable cavity formation in the upper portion of the right lung The lower portion of the right lung and the left lung showed no evidence of activity Sputum was positive for tubercle bacilli on May 30 and May 31, 1945 Laminograph studies on June 6, 1945



FIGURE 18 Case 5 Gross specimen

revealed an oblong-shaped cavity in the right mid-clavicular plane which was seen best at the two and four centimeter levels (from the anterior chest wall) beneath the right second rib. Artificial pneumothorax was begun on June 15, 1945 and continued until the time of operation.

A right upper and middle lobe lobectomy was performed on July 10, 1945. At the time of operation, numerous adhesions were encountered. One broad and fibrous adhesion contained vessels extending from the chest wall. Definite cavitation in the upper lobe was determined by palpation. Several shotty, discrete nodular areas of small size were palpable in the right upper lobe. At the time of operation it was felt that there were some small millary nodules present also in the middle lobe and for this reason the middle lobe was removed. However, subsequent examination has revealed that the middle lobe was free of disease. Microscopic tissue examination revealed tuberculosis of the right upper lobe with caseation and cavitation. There was no evidence of past or present tuberculosis of the right middle lobe. The first two days postoperatively the patient had a temperature elevation to 102 degrees and expectorated some thick mucous plugs, apparently due to atelectasis. He responded well to CO<sub>2</sub> and O<sub>2</sub> inhalations and penicillin. Temperature was normal the fourth day and remained so. A transitory ulnar neuritis was experienced for a few days following operation. This was undoubtedly due to the position of the right arm during the operation. Subsequent x-ray examinations of the chest showed the right lower lobe expanded and the diaphragm elevated, but no evidence of disease present. The left lung has remained clear. Bronchoscopic examination was done on August 27, 1945. Direct bronchial smears were negative for tubercle bacilli. September 25, 1945. An x-ray report from the Veterans' Facility in February 1946 revealed no further evidence of disease. Sputum examination May 1946, done elsewhere, was reported to be positive. However, x-ray films in June 1946 show no evidence of further change or disease. The patient's weight was reported to be over 200 pounds. He was feeling quite well and was afebrile. On November 30, 1946 animal inoculation with sputum was reported negative.

### COMMENTS

The cases presented and the surgical results obtained suggest that lobectomy may have a place in the treatment of the early lesion of tuberculosis in addition to pneumothorax and other procedures. Lobectomy should not be applied to every early or unilobar tuberculous lesion, since many of these lesions respond to conservative therapy. Patients with minimal lesions showing evidence of progression may be considered as possible candidates for lobectomy. The percentage of minimal lesions that will progress over a period of a year has been reported as 33 per cent or more. In the cases presented here, the progress of the disease appears to have been arrested in every instance. If this will hold true in a larger series of cases, lobectomy would appear to have advantages over the other procedures, such as pneumothorax, apicolysis, phrenic operations, open and closed intrapleural pneumonolysis, various treatments of cavities, and thoracoplasty. Admittedly

such procedures have a low mortality rate, but they do not always control the disease

### SUMMARY

1 Five consecutive cases of unilobar tuberculosis treated by lobectomy are presented with follow-up data

2 The classification of patients with minimal lesions into different groups is mentioned. The value of careful selection of patients for lobectomy is considered and the criteria for this selection outlined

3 The possible advantage of lobectomy in selected cases is discussed and compared with other methods of treatment

4 It is felt that lobectomy has a place in the treatment of early tuberculosis, although a larger series of cases will be required to substantiate this fully

### RESUMEN

1 Se presentan cinco casos consecutivos de tuberculosis unilobar tratados por lobectomía, incluyendo los datos de la observación subsecuente

2 Se menciona la clasificación de pacientes con lesiones mínimas en diferentes grupos. Se considera el valor de la selección cuidadosa de pacientes para la lobectomía y se bosquejan las pautas para esta selección

3 Se discuten las posibles ventajas de la lobectomía en casos seleccionados y se la compara con otros tratamientos

4 Se opina que la lobectomía tiene su lugar en el tratamiento de la tuberculosis precoz, aunque será necesaria una serie más extensa de casos para verificar completamente esta opinión

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# Treatment of Recurrent Spontaneous Pneumothorax with Gomenol\*

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Cajuput oil, or gomenol, deserves more recognition than it has received in the treatment of recurrent spontaneous pneumothorax. A survey of the literature of the past ten years finds this drug seldom mentioned, except to reject it as "uncertain" or "too caustic." However, we have evolved a safe and simple method to produce an obliterative pleuritis with gomenol, without the necessity of thoracoscopy or other operative procedure.

The mechanism of spontaneous pneumothorax has been thoroughly studied, and it is not the purpose of this paper to discuss etiology. To summarize, however, aside from disease in the lungs such as tuberculosis and silicosis, the cause is believed to be the rupture of an emphysematous bleb on the surface of the lung. Ornstein and Lercher<sup>1</sup> give an excellent review of the pathogenesis, and the reader is referred to this work for complete details. In the cases to be presented, one was of silicotic origin, the others idiopathic.

Many substances have been used in an effort to promote the formation of pleural adhesions. R. A. Young<sup>2</sup> used the patient's own blood, or 30 per cent glucose in combination with decompression. He also suggested the use of 5 per cent gomenolized paraffin as an oleothorax. Brunner<sup>3</sup> sprayed the lung fistula through a thoracoscope with substances to cause obliteration. Brock<sup>4</sup> used 5 to 10 minims of 10 per cent silver nitrate solution, and always thorascoped his patients prior to injection. Scrubbing of the parietal pleura with dry gauze has been tried, and tapes have been inserted into the pleural space to cause mechanical irritation.

Bethune<sup>5</sup> advocated the insufflation of  $\frac{1}{2}$  per cent iodized talc under thoracoscopic control, and rejected chemical irritants as useless, uncertain, or dangerous. Gowar<sup>6</sup> reviews a large number of substances in animal experiments, but agrees with Bethune on the use of poudrage.

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Gomenol has proved to be highly satisfactory when used by the method to be described. It is a volatile oil distilled from fresh leaves and twigs of *Melaleuca leucodendron*. It is a colorless or slightly yellowish liquid with a pleasant camphor odor.

The method of use is as follows. The patient is prepared by giving morphine sulfate 16 mg ( $\frac{1}{4}$  grain) twenty minutes prior to treatment. The patient is placed on the unaffected side, and, using aseptic precautions, one cc of gomenol in 5 cc of 1 per cent novocaine is inserted into the pneumothorax space, the mid-axillary line in the fourth interspace being the site of choice. A 10 cc syringe with an 18 gauge needle is used, care being taken that air can be drawn into the syringe before the gomenol is injected. There is usually a moderately severe pain reaction for several hours, which is controlled adequately by morphine sulfate 8 mg ( $\frac{1}{8}$  grain) every three to four hours for 24 hours. A moderate ( $100^{\circ}$  -  $102^{\circ}$  F) febrile reaction may occur on the first day.

A pleural effusion will begin to form in the first 24 hours, and the patient may complain of increased dyspnea. If too severe, air may be withdrawn until the intrapleural pressure is well on the negative side. In most instances the dyspnea will be eased without interference within 24 hours. Serial x-ray films will show rapid reexpansion of the lung, and the fluid tends to resorb rapidly. One injection is usually sufficient, but a second dose may be repeated in 3 days if the pleural reaction is not sufficiently great. Complete reexpansion will occur in two to four weeks.

Five cases are presented to show the effectiveness of this treatment. All had recurrent spontaneous collapses, one as a result of silicosis, the others of idiopathic nature. Ordinary methods of treatment failed to prevent recurrence of the condition.

All were engaged in non-strenuous occupations at the time of the pneumothorax. Four out of five were affected on the left side, which is characteristic, but contrary to published figures, three out of five occurred in women. The age range was from 21 to 50 years.

### CASE REPORTS

*Case 1* Mr E H, age 31 years. White male. Occupation Meter reader. On January 15, 1937, while riding to work on a streetcar, the patient experienced a sharp knife-like pain in the left chest, producing a choking sensation and nausea. He was placed in bed by his physician and remained there for one week, then returning to work with occasional pain in the left chest on exertion. Increasing shortness of breath, chest pain and exhaustion made him again consult his physician, when a diagnosis of spontaneous pneumothorax was made after x-ray examination.

On June 1, 1937, air was withdrawn from the chest and 500-700 cc were withdrawn twice weekly for several weeks. No re-expansion of the lung occurred, so the patient was admitted to the Tuberculosis League.

Hospital on July 20, 1937 X-ray examination showed almost complete collapse of the left lung, with the exception of some apical adhesions. There was mediastinal herniation and dislocation of the heart to the right. Laboratory findings: Urine, neg., RBC, 5,280,000, WBC, 8,450, Hgb, 84 per cent, Sputum, repeatedly negative for tubercle bacilli.

On July 21, 1937, a thoracoscopy was performed and there appeared to be a very slight perforation of the lung at the apex. Adhesions at the apex were partially dissected in an effort to make a better collapse and close the perforation. Closed drainage of the chest under a water seal was carried out following thoracoscopy, but the lung did not re-expand under this treatment. The symptoms were somewhat alleviated, however, and he was discharged on July 26 as improved, since herniation and dislocation of the mediastinal structure were not present at this time.

His symptoms recurred about a month later, and he was re-admitted to the hospital on September 8, 1937, for closed withdrawal of air. On admission,  $\frac{1}{4}$  cc of gomenol and 10 cc of normal saline were injected in the left pleural space. One week later 1 cc of gomenol and 10 cc of normal saline were injected, and a week following this, the same dosage was repeated. There was continuous drainage of air under closed water seal for two weeks, following the injection of gomenol. He complained of acute pains in the side for one day after the first dose of gomenol. After two weeks, closed drainage was discontinued.

Serial x-ray films showed pleural effusion in the left pleural space and beginning re-expansion of the lung, so that by the time the patient was discharged on December 23, 1937, there was complete re-expansion of the left lung, a small amount of fluid at the left base, and some retraction of the mediastinal structures to the left. The lung fields remained clear. The patient gained eight pounds in weight while in the hospital. The gomenol caused no febrile reaction. There has been no recurrence of pneumothorax since discharge from the hospital.

*Case 2* Mrs J Z, age 43 years. White female. Occupation Housewife. Admitted to the Tuberculosis League Hospital on December 12, 1940, with a diagnosis of spontaneous pneumothorax on the right side.

Twelve years prior to admission, the patient suddenly developed severe dyspnea, associated with pains in the right chest. Following examination, the patient was told that she had a spontaneous pneumothorax, air was removed from the chest and the patient was confined to bed for two weeks. She then returned to her normal activities.

Six years prior to admission, while bending over, she was seized with the same symptoms of pain in her chest and sudden dyspnea. Air again was removed from the chest on several occasions and she was on bed rest for several weeks. She then returned to normal activities and had no recurrence until four weeks prior to her admission to the hospital when she noticed a gradual onset of dyspnea. Spontaneous pneumothorax was again diagnosed and air was removed by the family physician, which alleviated the dyspnea. However, symptoms returned in three days and it was necessary to remove air again. She was then referred to the Tuberculosis League Hospital for treatment.

The patient complained of no symptoms other than shortness of breath. On admission to the hospital the above history was obtained. The patient appeared somewhat dyspneic. The physical examination was essentially negative except for signs of pneumothorax over the right chest and some displacement of the heart to the left. Blood pressure was

136/70 Laboratory findings Repeated sputum examinations were negative for tubercle bacilli and the sedimentation rate was 16 mm in 60 minutes, RBC, 4,810,000, WBC, 12,800, Hgb, 94 per cent, Urine, neg, Kahn, neg X-ray examination showed a 45 per cent pneumothorax on the right side, with shift of the mediastinum to the left for about one and one-half inches The lung fields appeared clear

The day following admission 0.5 of one cc of gomenol and 10 cc of saline were injected into the right pleural space Two more injections of 1 cc of gomenol and 10 cc of saline were given, with one day intervals between injections This created severe pain in the right side and a pleural effusion started to form almost immediately Due to dyspnea caused by fluid formation, 400 cc of air were removed on December 13, with a final pressure of -1, -5 On December 20th, 700 cc of air were removed with a final pressure of +4, -4 Following this, it was not necessary to remove more air X-ray examination on January 22, 1941, showed the lung to be almost completely re-expanded with some effusion still present in the right pleural space The patient was then discharged on February 15, 1941 Fluoroscopy at that time showed the lung to be almost completely re-expanded, and the effusion was gradually disappearing Since discharge from the hospital, the lung has completely re-expanded, the effusion has disappeared, and there has been no recurrence of pneumothorax

*Case 3* Miss F S, age 21 years White female Occupation Registered nurse In April, 1945, this patient had a spontaneous pneumothorax on the left side, of about 20 per cent This was accompanied by slight shortness of breath and occasional pain on deep inspiration She was in another hospital for three weeks, and returned to work after a month of convalescence On December 21, 1945, the patient began to experience pain in her chest on deep breathing, and some shortness of breath This was accompanied by weakness She lost ten pounds immediately following the onset of these symptoms X-ray at that time showed a pneumothorax of about 5 per cent over the apex of the left lung She was then placed on bed rest and by January 1, 1946, the lung appeared to be re-expanded The patient then returned to work On February 9, 1946 the patient again experienced the above symptoms, and a pneumothorax of about 20 per cent was discovered on the left side At that time 1 cc of gomenol in 5 cc of novocaine was injected into the left pleural space This was accompanied by typical severe pain reaction which was controlled by morphine The patient remained in bed for several weeks, a further x-ray examination on March 22, 1946, showed the left lung to be completely re-expanded, with thickening of the diaphragmatic leaf and a very small amount of effusion at the left base The patient returned to work on May 1, and has been well since The lungs were negative for tuberculosis or any other pulmonary infection The blood count, temperature, and sedimentation rates were always within normal limits

*Case 4* Mr J K, age 50 years White male Occupation Materiel man for steel company Patient gave a history of having been a brick layer, laying fire bricks in a steel mill for 24 years with exposure to dust and sand

A previous diagnosis of second stage silicosis had been made and the patient was receiving compensation for this disease Two years prior to admission, the patient suddenly became short of breath and his phys-

ician found a left pneumothorax. He was placed on bed rest for three months, after which time the lung had re-expanded. The patient then returned to ordinary activity and remained well until three weeks prior to admission when he again became quite short of breath after working in the garden. His dyspnea had been getting worse until the time of admission, and x-ray films showed partial collapse of the left lung. Rather sharp pain had been noticed in the left chest. He was admitted to the Tuberculosis League Hospital on April 26, 1946, with the diagnosis of second stage silicosis and left pneumothorax. Physical examination revealed signs of pneumothorax in the left chest, with rales over the right chest anteriorly and posteriorly. Blood pressure was 98/70. Patient was quite short of breath. Laboratory findings: Sputum had been negative for tubercle bacilli for several years, and remained negative while in the hospital. Urine, neg, RBC, 5,350,000, WBC, 6,250, Hgb, 94 per cent. Sedimentation rate was 10 millimeters in 60 minutes.

X-ray examination on admission showed silicosis, second stage, 20 per cent pneumothorax of the left lung, with adhesions to the first and second interspaces. On the day following admission, 1 cc of gomenol and 5 cc of 1 per cent novocaine were injected into the left pleural space. This caused severe pain in the right side, which was easily controlled by morphine. The following day, because of increasing dyspnea, 300 cc of air were removed from the pleural space. Pleural effusion developed quickly so that on April 30, a further 300 cc were removed, and on May 1st, 200 cc were removed with final pressure of -3, -7. The pleural effusion almost completely filled the pleural space. No further air was removed. The lung began to re-expand rapidly, so that on May 7, there was almost complete re-expansion of the left lung with a pleural effusion extending to the fifth intercostal space anteriorly. He was discharged on May 11, 1946, and an x-ray film one month later showed complete re-expansion of the left lung. There was no effusion present at this time. The patient has remained well since leaving the hospital.

*Case 5* Mrs E M, age 25 years. White female. Occupation Housewife. In July 1945, the patient developed a severe pain in the left chest, posteriorly, with some shortness of breath. X-ray films in another hospital showed a spontaneous pneumothorax. She was placed on bed rest for several days, and then returned to normal activity after x-ray films showed the lung had re-expanded. There was no recurrence until May 17, 1946, when she again developed pain and some shortness of breath. A diagnosis of recurrent spontaneous pneumothorax was made. She was admitted to the Tuberculosis League Hospital on May 27, 1946. X-ray examination showed a pneumothorax of 20 per cent on the left side. Laboratory findings: Sedimentation rate was 24 millimeters in 60 min, Urine, neg, RBC, 4,720,000, WBC, 16,800, Hgb, 91 per cent.

On the day of admission, 1 cc of gomenol and 5 cc of 1 per cent novocaine were inserted in the left pleural space. An intense pleuritis developed with severe pain, but this was controlled by morphine. It was not necessary to withdraw air. A pleural effusion developed rapidly, and the patient had a febrile reaction with a peak of 102 degrees F for two days. The temperature then returned to normal. On June 3, x-ray examination showed almost complete re-expansion of the left lung with the exception of a small area of pneumothorax over the apex and a pleural effusion extending to the second rib anteriorly. The patient was discharged on June 5. An x-ray film two weeks later showed the lung to be

completely re-expanded with a small amount of effusion at the left base. She has remained well since discharge.

### COMMENT

It may be seen that gomenol given intrapleurally sets up an intense sterile pleuritis. However, it is felt that 1 cc diluted in 5 cc of 1 per cent solution of novocaine is not sufficient to cause any adverse pleural reaction such as necrosis and perforation. Its use in reexpanding tuberculous lungs for thoracoplasty is probably not advisable.

The only adverse reactions encountered have been pain and fever, the former being easily controlled with morphine, and the latter subsiding of its own accord.

Using the technique described, gomenol has proved to be an excellent drug in the treatment of recurrent spontaneous pneumothorax.

### SUMMARY

1 Following a short review of substances used for the production of artificial pleurodesis, a technique is described for the use of gomenol in recurrent spontaneous pneumothorax.

2 Five cases successfully treated by this method are presented.

3 A wider use of gomenol for curing recurrent pneumothorax is suggested.

### RESUMEN

1 Después de revisar brevemente las sustancias que se emplean para producir la pleurodesia artificial, se describe una técnica para el uso del gomenol en el neumotórax espontáneo recurrente.

2 Se presentan cinco casos tratados satisfactoriamente con este método.

3 Se recomienda el uso más extenso del gomenol para curar el neumotórax recurrente.

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# The Diagnostic Significance of Clubbed Fingers\*

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Since the association of clubbed fingers with chronic pulmonary disease has been noted from the time of Hippocrates and discussed repeatedly, especially during the past five decades, this report will only include its differential diagnostic possibilities and stress the necessity for chest x-ray examinations and bronchograms in all patients with clubbed fingers. This watch glass deformity of the fingernails, associated with broadening of the terminal phalanges and frequently accompanied by an ossifying periostitis of the long bones, is recognized by several different names. The first description of this deformity of the extremities with chronic empyemas by Hippocrates led to the term Hippocratic fingers. When Marie and Bamberger called attention to the associated thickening and sclerosis of the long bones it became known as the Marie-Bamberger's disease. The term acropathy was applied in 1920 to simplify the nomenclature. Hypertrophic pulmonary osteoarthropathy is probably the most common name in use today for the underlying bony changes. According to Cushing<sup>1</sup> the thickening and sclerosis of the bones is thought to present a later stage of progression of the disease, although Shapiro<sup>2</sup> claims to have noted bony changes precede the clubbing of the nails.

In addition to chronic pleuro-pulmonary diseases, clubbing of the fingers has also been frequently noted in patients with congenital heart disease, subacute bacterial endocarditis, cirrhosis of the liver and chronic intestinal diseases, such as advanced ulcerative colitis, amebic dysentery, and polyposis. It is also noted occasionally in postthyroidectomy myxedema, syphilis and malignancy of the thymus. Occasionally unilateral clubbing has been described in association with aneurism of the aorta and surrounding large vessels on the same side. Loucaides<sup>3</sup> was able to find only 18 such cases in 1932, although a number have been reported since.<sup>4</sup> A familial clubbing of the fingers and toes in the absence of any underlying pathology has also been reported a few times. According to Seaton,<sup>5</sup> until 1938 there were two instances in which the clubbing was present in members of three successive genera-

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tions and six instances on record of its presence in two successive generations

The mechanism of development of clubbed fingers and hypertrophic pulmonary osteoarthropathy is still somewhat conjectural and has been discussed at considerable length in a number of other papers listed in the bibliography. The infectious and toxic theories are not well substantiated due to its frequent presence in the absence of any infectious process in a number of cases of congenital heart disease, pulmonary arterio-venous aneurisms, hepatic cirrhosis and some cases of bronchogenic carcinomas without any associated pulmonary infection. The presence of unilateral clubbing associated with aneurism of the aorta and subclavian arteries also suggests a localized interference with the blood supply rather than a generalized toxemia. Compere, Adams and Compere<sup>6</sup> reported no successful attempts in animals at reproduction of hypertrophic pulmonary osteoarthropathy by the injection of toxins or attempted simulation of chronic pleuro-pulmonary diseases until 1935. Mendlowitz has done some very interesting experimental work on this disease during the past few years. By measuring the digital heat elimination and arterial blood pressure he<sup>7</sup> concluded that "the maximum heat elimination and hence the blood flow of the distal phalanges of clubbed fingers secondary to lung or congenital heart disease is usually increased, as well as the digital arterial pressure." A few years later he<sup>8</sup> reproduced a condition similar to congenital heart disease in the dog by anastomosing the left pulmonary artery to the left auricle, thereby greatly reducing the oxygen saturation of the blood by this shunt. Out of four successful experiments only one animal showed hypertrophic pulmonary osteoarthropathy. Schlicke and Barger<sup>9</sup> report the frequent occurrence of clubbed fingers in advanced cases of ulcerative colitis, but are unable to give a satisfactory explanation except on the basis of oxygen deficiency due to anemia and circulatory insufficiency in debilitated patients with a chronic disease. The clubbing associated with hepatic cirrhosis could also be explained on a circulatory basis.

The principle purpose of this report is to emphasize the importance and necessity of chest x-ray examinations and bronchograms in every patient in whom clubbed fingers are noted on a routine physical examination. A review of the records of 299 lobectomies for bronchiectasis and chronic lung abscesses at Barnes Hospital in St. Louis revealed complete descriptions of the finger nails in only 129. Of this number 103, or 79 per cent, were noted to have had clubbing of the fingers in varying degrees. Eleven chronic lung abscesses without associated bronchiectasis were present in this group in whom 10, or 90 per cent, were recorded



de tuberculosis pulmonar, particularmente en los periodos más avanzados de la enfermedad

3 La osteoartropatia pulmonar puede ser uno de los valiosos signos precoces del carcinoma broncogénico y del tumor mixto del bronquio

4 La relativa frecuencia de osteoartropatia es baja en enfermedades intestinales, hepatopatías, sífilis y en las otras causas de dedos en clavija, comparada con su frecuencia en pleuro-neumopatías y cardiopatías congénitas

5 Todo enfermo con dedos en clavija debe recibir un completo examen radiográfico del tórax, inclusive de broncografía, a menos que sea evidente el diagnóstico en la simple película radiográfica

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# The Second Stage Thoracoplasty

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Many surgeons and patients alike share the belief that the second stage of a paravertebral thoracoplasty, in comparison with the first stage, is a simple procedure. This has not been our observation, especially in so far as the comfort of the patient is concerned. This paper is offered to compare the reactions of the patient after the second stage with those which he experienced after the first stage, and also to present certain data which we have found advantageous in improving the management of the patient before and after the second stage.

Literature concerning the first stage thoracoplasty has been ample and quite understandably has indicated that this first operation, because of its peculiar technical difficulties should be designated as the major bridge to be crossed. Consensus gives proper emphasis to the difficulty in obtaining adequate exposure in the removal of the first rib, a step that has been made immensely more simple however by severing the serratus magnus muscles as suggested by Alexander.<sup>1</sup> We have reason to appreciate the importance of good exposure, since we have twice had the misfortune of injuring the subclavian vein, with the succeeding good fortune, however, of safe repair for each of the injuries. An additional difficulty which we concede as being greater in the first stage operation than in the second concerns the problem of severing the heavy rhomboid muscles. Retraction and adequate exposure are much harder to achieve, and an annoying hemorrhage which accompanies the first stage incision of these muscles is much less noticeable in the second stage procedure.

In reviewing the major difficulties of first stage thoracoplasty and in considering the length of time required for its operation, the surgeon, on first thought, might consider this stage as the one of greater proportion. But what of the patient's clinical course, in comparing the two operations? What are his reactions—and what is his mental attitude? We would rather consider this approach to the subject as the criteria upon which we base our comparison of the two operations instead of the technical surgical difficulties of the operation alone.

Over a period of twenty years, we have had ample opportunity to study the progress of the patient following each stage, and we

have concluded very definitely that in most instances the second stage is not tolerated by the patient as well as the first. Most of our complications have followed the second stage, and of significant importance is the fact that the patient complains of more pain, a situation which requires the use of more sedatives over longer periods of time. In addition, the patient notices a more pronounced loss of function of his arm, since he suffers pain in his attempts to use it. Breathing is more difficult, necessitating for relief frequent use of the oxygen tent and, in some instances, over a longer period of time than is required after the first stage. Coughing, though somewhat reduced by the earlier removal of the top ribs, is decidedly more painful, and is productive only after considerable effort on the part of the patient. Frequently, following the second stage operation, the patient will epitomize the situation by the succinct complaint, "If I could have known this would be so painful, I would never have undertaken it." A complaint rarely heard after the first stage operation.

A further appraisal of the situation reveals that wounds, following the second stage, tend to heal more slowly and have a greater tendency either to become infected or to develop a non-purulent drainage. This handicap is explained by the presence of remaining bits of cat-gut which were not absorbed during the interval between the two stages, and further by the fact that sufficient time usually has not elapsed for the complete re-establishment of the interrupted circulation, with the result that the power of healing and of resistance to infection is lessened.

A final aspect of disadvantage concerning the second stage operation is shown in the loss of vital capacity, a hazard which is much greater than that succeeding the earlier operation, and for the obvious reason that the removal of the long rib sections now deprive a larger area of lung tissue of its previous overlying bony support. A greater degree of lung collapse must inevitably ensue. In the first stage operation, the removal of the first two or three ribs alters only slightly the vital capacity of the patient. We have concluded that we would be within the realm of safety in performing the upper stage of a thoracoplasty upon a patient with a capacity of 1,000 to 1,200 cc., but would certainly be within the realm of danger to perform the second stage with the same vital capacity. In other words, there must be neither too many ribs, nor too great a length of a few ribs removed in this operation. If a greater degree of relaxation of the lung should be required, it is far wiser to do three or four operations rather than to harass and endanger the patient with the excess difficulties that attend the crowding of the work into two stages.

Concerning management, we have found that the length of

time allowed to elapse between the first and the second stage operations is a very important factor. Formerly, it has been our custom to perform the second stage at the end of ten or twelve days. Later we extended this period to fifteen days, but more recently we have insisted that eighteen to twenty-one days must intervene before the second stage is undertaken. This increased interval makes it possible for the patient to come to the second stage in far better condition. During the last week of this intervening period the patient's appetite improves, his cough diminishes, and the freedom from pain allows him to have his much needed sleep and rest. Furthermore, we are able to have him out of bed for a few days, between stages, which circumstance has an important influence on the circulation and the general well being of the patient as well as giving an impetus to wound healing.<sup>5</sup> In addition, the patient's morale invariably improves when he is permitted out-of-bed privileges. Ochsner<sup>2</sup> has pointed out the importance of ambulation, both pre-operatively and post-operatively, for this type of patient.

During the interim other advantageous results can be accomplished in preparing the patient and in lessening the danger for him. We advocate early feeding, and in fact begin feeding the patient almost within twenty-four hours after the first operation. Since hypoproteinemia is frequently associated with chronic lung infections, we believe that special emphasis should be placed on a high protein diet. And because of the importance of vitamin C in wound healing, we suggest a daily dosage of 100 milligrams of ascorbic acid to be given the patient for a week prior to each operation, but this is of especial importance before the second stage.

We have found that there is rarely a need for a blood transfusion during the first two or three days of the interim period, since we routinely transfuse the first-stage patient on the operating table, giving 500 to 1,000 cc of whole blood. Some four or five days after the operation, we give whole blood transfusions until the red blood cell count is above 4,000,000, and the hemoglobin above 70 per cent, thus assuring the patient a greater margin of safety.

Another routine which we follow is that of administering penicillin to all of our patients for two days prior to the operation, and for three days succeeding the operation also, the amount to be 20,000 units every three hours. For the comfort of the patient who may complain of disturbed sleep by the administration of dosage during the night, we have discontinued the penicillin during those hours, unless, of course, infection has already developed. In our opinion, the importance of rest in the prevention of in-

fection supersedes the advantage which might be gained by routine dosage of penicillin throughout the night

Before closing, we should like to offer a suggestion concerning the choice of anaesthetic to be used since we believe this factor to be a highly important one in second stage thoracoplasty. For the previous operation we have found it advantageous to employ intratracheal anaesthesia, because of the difficulty encountered in obtaining relaxation of the heavy muscles attached to the scapula. However, for the second stage, we have abandoned the use of this type of anaesthesia, since fewer muscles are encountered. Instead, during the past three years we have employed sodium pentothal intravenously, supplemented with local anaesthesia of one per cent novocaine. The sodium pentothal brings about a quiet induction, and the patient, released from fear, is quickly brought to the stage of surgical anaesthesia. We find an advantage in supplementing the main anesthetic with novocaine, since the entire operating procedure can be carried out with a minimum amount of pentothal, thus lessening the likelihood of respiratory depression, a condition which would otherwise be an objectionable feature to this method of anaesthesia. In our experience, we have had only one patient who had respiratory difficulties, which trouble we attributed to the fact that three grains of nembutal had been given the patient three hours prior to the operation. As is well known, this sedative is definitely contraindicated when sodium pentothal is used. Another advantage which ensues when this method of anaesthesia is used, concerns the amount of secretion which may accumulate in the trachea and bronchi. Not only is the amount less following the operation, but the small amount which does accumulate is coughed up easily by the patient because of quickly returning reflexes. Coughing is made easier by the reason of the fact that the paravertebral anaesthesia block lessens the pain and does not cause the patient to limit his coughing excursion. Gurd<sup>4</sup> advocates spinal rather than general anaesthesia for the second stage and for the same reason that we have abandoned the general anaesthesia. Because the results we have experienced in our method have been so satisfactory, we feel justified in recommending it.

### SUMMARY

The clinical reaction and the mental attitude of the patient, following the first and second stage of a paravertebral thoracoplasty, are contrasted, correcting the often accepted belief that the second stage is of less importance to the patient than the first.

From experience of twenty years it is concluded that the second stage is not tolerated as well as the first. There is a greater inci-

dence of complications Increased pain on coughing and on use of the arm requires more sedation Respiration is more difficult, requiring an oxygen tent for a longer period The wound heals more slowly and exhibits a greater tendency to either become infected, or to develop a non-purulent drainage, due to remaining bits of catgut not absorbed in the interval between the two stages and, because of incomplete re-establishment of circulation Finally, the loss of vital capacity is greater

Measures adopted to lessen the gravity of the second stage thoracoplasty consist of the following

- 1 Increasing the interval between stages from ten or twelve days to eighteen or twenty-one days This time shows improvement in appetite, diminished cough and allows much needed sleep and rest Ambulation for a few days has an important influence on the circulation, general well-being, and, morale of the patient
- 2 Feeding early, with special emphasis given to a diet high in protein content Blood transfusions are added as needed and vitamin C is administered
- 3 Combatting infection by use of penicillin
- 4 Choosing an anesthetic which lessens complications Intravenous sodium pentothal supplemented by paravertebral block with one per cent novacaine is recommended A quiet induction, quick return of cough reflexes, lessened secretions, and decreased pain on postoperative coughing are advantages of this method

### RESUMEN

Se comparan la reacción clínica y la actitud mental del enfermo siguientes a la primera y segunda etapas de una toracoplastia paravertebral, y se corrige la creencia, frecuentemente aceptada, de que la segunda etapa es, para el paciente, de menor importancia que la primera

A base de la experiencia de veinte años se concluye que no se tolera la segunda etapa tan bien como la primera Sobrevienen con mayor frecuencia las complicaciones Se siente más dolor al toser y al mover el brazo, lo que requiere más sedantes Es más difícil la respiración y se necesita la tienda oxigena por un período más largo Se cicatriza más despacio la herida y manifiesta mayor tendencia a infectarse o a producir un drenaje no purulento, causado por los pedacitos de catgut que no se han absorbido en el intervalo entre las dos etapas, y debido a la incompleta restauración de la circulación Finalmente, es mayor la pérdida en la capacidad vital

Han sido adoptadas las siguientes medidas para disminuir la gravedad de la segunda etapa

- 1 Prolongar el intervalo entre las etapas de diez o doce días a dieciocho o veintiun días Este período permite que mejore el apetito y disminuya la tos, y proporciona sueño y descanso que son muy necesarios El levantarse por unos cuantos días ejerce una importante influencia sobre la circulación, el bienestar general y el estado de ánimo del paciente
- 2 Alimentar al enfermo pronto, recalcando especialmente la importancia de una dieta rica en su contenido de proteínas Se dan transfusiones de sangre cuando son necesarias y se administra vitamina C
- 3 Combatir infección mediante el uso de penicilina
- 4 Escoger un anestésico que disminuya las complicaciones Se recomienda el pentatol sódico por la vía intravenosa, reforzado por bloqueo paravertebral con novocaína al uno por ciento Las ventajas de este método son tranquila inducción, rápida reaparición de los reflejos de la tos, disminución de secreciones y menor dolor con la tos postoperatoria

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# Observations on Cystic and Bullous Emphysema of the Lungs\*

## A Study of 100 Cases

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### *Classification*

The two forms of emphysema are distinguished from each other largely by the size of the emphysema cavities and by the association with other pulmonary diseases

In cystic emphysema the cavities are very large, often simulating pneumothorax on the roentgenogram, and there is generally no accompanying infectious process in the lungs. The cysts involve the upper and mediastinal parts of the lungs, regions not very active in air exchange. Symptoms are few and these cases are generally discovered accidentally.

In bullous emphysema the cavities are smaller and more numerous, and in this condition there is invariably an associated chronic lung disease such as asthmatic bronchitis, bronchiectasis, tuberculosis, or silicosis. The more active basal portions of the lungs are involved, and the symptoms are pronounced.

The cystic cavities appear early in life and increase in size gradually with the growth of the chest, without encroaching on the adjacent lung. This is one reason the condition may develop to a spectacular degree before it is discovered clinically.

Bullous emphysema is a disease of adults, and the cavities develop and progress at the expense of the neighboring lung lobules.

### *Pathogenesis*

Emphysema is conceived as an atrophy of the lung caused by the effect of an inadequate blood supply to an organ functioning, at times, under great stress.

The bronchial artery, the nutritional vessel of the lung, is the smallest of the visceral arteries. The lung is more vulnerable to vascular accidents such as embolism, gangrene, infarction, and hemorrhage, than any other organ, and the degenerative process of emphysema is attributable to the same vascular factor.

Postmortem the anemia of the emphysematous lung is striking,

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and histologically there is an obvious disappearance of the capillaries. Roentgenologically, there is increased transparency of the lung caused by a loss of the vascular markings, the larger pulmonary trunks, however, undergo enlargement and densification.

All the lung elements and the alveoli are complete in childhood. With the growth of the chest the lung undergoes enlargement chiefly by stretching and confluence of alveoli. The blood supply is adequate for the nutrition of the bronchi, but in the periphery of the lung atrophic changes appear early in life. By middle life hardly an individual escapes the degenerative change in the lungs.

In asthma and in other states of bronchial spasm and bronchial stenosis the progress of emphysema is enhanced by the overinflation and stretching of the lung. With the relief of the bronchial obstruction, the lung will not often return to the original state, but will remain emphysematous, due to the inadequate vascularization.

### *Review of 100 Cases*

One hundred cases of emphysema have been studied with particular reference to the origin and course of the disease. The subjects are veterans of the Spanish American War and veterans of World War I. All of the cases have been under observation for several years, some of them for 20 years and longer. Thirty cases were followed to postmortem examination.

In several cases the lung changes began and developed while under observation, in the majority, emphysema was present when the patients first presented themselves, in most cases there was a tendency to steady, though slow, unfavorable progression. In 3 cases temporary improvement was registered on the series of roentgenograms.

Our data indicate that cystic emphysema is not usually a congenital condition but is acquired, generally, early in life. In many cases the roentgenographic evidence of the disease manifests itself after military age is reached.

In case XC-285 304, the histological sections of the lungs show the text-book picture of congenital lung cyst. However, the available clinical and x-ray records show conclusively that the condition developed since the man's military service.

Cystic emphysema is often associated with the ordinary diffuse form of vesicular emphysema, the air cysts representing an exaggeration of the atrophic changes in certain areas of the lungs. Common to the two forms of emphysema are the vascular changes, namely destruction and disappearance of the capillaries and atherosclerotic and endarteritic changes in the large pulmonary vessels.

An impressive number of these cases, 28 in number, had advanced systemic arteriosclerosis and hypertension. This finding is in agreement with the vascular theory of emphysema. The blood supply to the lung is further impaired by the general vascular inadequacy.

There is a surprisingly large number of negroes in the group, 16 cases. The explanation would lie in the greater incidence of vascular disease among negroes.

Syphilis occurred in 15 of the 100 cases, and is considered an important etiologic factor, prone as it is to attack the vascular system. Tuberculosis, 19 cases, and silicosis, 9 cases, are other important factors.

The diagnosis of pulmonary syphilis was entertained clinically in 4 cases and was suspected in several others. In 3 cases the pathologist described vascular changes in the lungs which are considered indicative of syphilis.

In the chronic forms of tuberculosis there was overinflation and stretching of the uninvolved portions of the lungs caused by mechanical factors and altered space relations between the contracting lung and the non-yielding bony thorax. The loss of abdominal fat and of muscle tone in the abdominal muscles causes a descent of the diaphragm with stretching of the basal portions of the lungs. The decrease in the size of the heart has a similar stretching effect on the lungs.

In the more acute cases of tuberculosis bronchostenotic lesions were operative.

In four cases there was compression of a main bronchus by enlarged lymph nodes.

In the cases with silicosis periarteritic fibrosis was conspicuous. Otherwise the same factors were operative as in chronic tuberculosis.

Allergic bronchitis and asthma was present in 23 cases and produced progressive emphysema. The resultant air cysts appearing in the series of roentgenograms differ in way from those developing in cases without bronchial spasm.

A most interesting and unexpected finding was the development of bronchial carcinoma in seven of the cases of cystic emphysema. No bronchial carcinoma has as yet developed in any of the cases of bullous emphysema in this group.

### SUMMARY

The author analyzes 100 cases of advanced Bullous and Cystic Pulmonary Emphysema.

In Bullous Emphysema there is a causative or associated lung infection and there are disabling symptoms. Cystic Emphysema develops early in life and progresses without bronchial infection.

and without bronchial spasm, and gives few subjective complaints

In most cases of Emphysema there are signs of vascular degeneration disappearance of the smaller pulmonary radicles and arteriosclerotic or endarteritic changes in the larger pulmonary arteries

A discussion of the vascular factor in the pathogenesis of emphysema is included

### RESUMEN

Analiza el autor 100 casos avanzados de Enfisema Pulmonar Vejigoso y Quístico

En el Enfisema Vejigoso existe una infección pulmonar causal o asociada, y ocurren síntomas incapacitantes El Enfisema Quístico aparece a una edad temprana, progresa sin infección o espasmo bronquiales y ocasiona pocos síntomas subjetivos

En la mayor parte de los casos de Enfisema existen síntomas de degeneración vascular, a saber desaparición de las más pequeñas radículas pulmonares y alteraciones arterioescleróticas o endarteríticas en las más grandes arterias pulmonares

Se incluye una discusión del factor vascular en la patogenia del enfisema

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# Treatment of Complications Arising in the Course of Pneumothorax Therapy of Pulmonary Tuberculosis\*

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## *Introduction*

The tuberculosis unit of United States Naval Hospital at Corona, California, was commissioned in July of 1943. The purpose of the unit was to care for patients suffering from established active pulmonary tuberculosis. By reason of the usual rotation of medical officers, the staff of this unit has experienced continuous change and therefore the individual care of various patients has shown a variety of methods and concepts, although the policies of the institution have, in general, remained the same.

The statistical data concerning U S Naval Hospital, Corona, California, Tuberculosis Unit from opening date, July, 1943 to May 1, 1946 is as follows:

Total admissions	2,838
Total discharges	1,713
Readmissions	18
Patients remaining	1,025
Deaths	82

In one significant characteristic, the care of the patients in a Naval hospital varies from the usual course of treatment of tuberculosis. The average stay of the patient in the hospital is about 8 months only. The Navy does not care for these patients until their ultimate recovery or other termination of treatment except in the case of officers who have been retired by reason of their disease or in the case of enlisted men belonging to Fleet Reserve. Following this policy, it has been the aim of the hospital to attempt to control the activity of a tuberculous infection by such means as may be indicated and then to transfer the patient to a Veterans' Administration hospital for convalescent or further care. It will be evident from this explanation that the staff of the hospital has not been able to follow its cases for a determination of the end results of the treatment instituted.

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\*\*From the Tuberculosis Service, United States Naval Hospital, Corona, California. This paper reflects the views of the author and is not to be considered as representing the policies of the Medical Department, U S Navy.

The purpose of this paper is to set forth the methods which have been evolved in the organization above described for the treatment of complications which have developed during the course of pneumothorax therapy

Bedrest has been the essential factor in all treatment and is instituted and associated with all other methods of treatment discussed

Pneumothorax has been considered routinely in all cases of proved active tuberculosis except those which show a fairly stable minimal involvement. The majority of minimal cases now undergoing pneumothorax therapy in the unit had their procedure instituted elsewhere. All suitable cases should have pneumothorax attempted, and further procedures should be carried out only if it is not successful. Individuals demonstrating dense pneumonic tuberculosis are considered unsuitable for pneumothorax and there is a general disinclination to its institution during an acute, toxic febrile reaction.

Temporary interruption of the phrenic nerve has been practiced extensively and has been used alone, with pneumothorax, or with pneumoperitoneum and other procedures. We have experienced gratifying results in its use in many cases under varying conditions.

Pneumoperitoneum, in connection with paralysis of one wing of the diaphragm, has had a rather more extensive use than at some other institutions. The results of this procedure have likewise been gratifying, particularly in those cases where no other form of collapse therapy could be adopted.

In a paper having the scope of this, it is not possible to discuss the more radical surgical procedures, and therefore, it is proposed to limit discussion of complications to those experienced in the above procedures.

The complications of pneumothorax are divided indefinitely into two groups: immediate (i.e., associated with the acts of instituting or refilling pneumothorax) and, late.

### *Classification of Complications of Pneumothorax Treatment*

#### I Incident to the performance of pneumothorax

##### a Early

- 1 "Pleural shock"
- 2 Pulmonary embolism
- 3 "Spontaneous" pneumothorax
- 4 Chest wall injury—hemorrhage
- 5 Subcutaneous emphysema

##### b Late

- 1 Pleural effusion

2 Spontaneous rupture of pleural adhesion

3 Gross interference with vital capacity

II Incident to intrathoracic changes caused by pulmonary infection

a Tuberculous pleurisy and empyema

b Atelectasis

c Bronchopleural fistula and secondary infection

d Chest wall abscess

III Conditions interfering with adequate pneumothorax

a Pleural adhesions

b Tension cavity

Prevention is the best treatment for immediate complications. The patient is prepared for the initial pneumothorax, the procedure and the results desired being explained. Sedation, pentobarbital sodium grs  $1\frac{1}{2}$ , is usually administered to initial cases. The anesthetic is 1 per cent procaine and it is injected through a  $1\frac{1}{2}$  inch 22 gauge infiltration needle after the skin has been cleansed with tincture of merthiolate. The procedure has been to raise a wheal by intradermal injection in skin stretched between the thumb and forefinger and then to follow through the same wheal until the parietal pleura is reached, this structure being then anesthetized by further injection of procaine. The site of election is the 5th intercostal space in the anterior axillary line unless disease immediately underlying this area contra-indicates. One should go above rather than below a rib. Following anesthesia, the infiltration needle is withdrawn and an 18 gauge  $1\frac{1}{2}$  inch needle, attached by tubing to the manometer of the pneumothorax machine, is inserted into the pleural space. It is generally preferred that a short bevel needle be used for initial pneumothoraces, and when such needle is used, it is helpful to make a small incision in the skin with a scalpel, or, better, to puncture the skin with a sharp bevel 18 gauge needle prior to the insertion of the pneumothorax needle. Before the administration of air, it is absolutely essential that good negative manometric readings be obtained, usually ranging between  $-14$  to  $-8$  cm  $H_2O$  on inspiration and  $-8$  to  $-4$  cm of  $H_2O$  on expiration. At the time of initial administration, and following recording of the manometric reading, 50 cc of air is introduced slowly followed by a second reading of the manometer. From the change in pressure brought about by the 50 cc of air, an estimate of the patency of the pleural space and the amount that can be safely given can be made. It has been the practice to administer 300 cc at the initial introduction of air and to increase this by 100 cc every 4th day but rarely exceeding

500 cc at any one administration. The patient remains flat in bed for the first 24 hours following the initial procedure. He then is routinely fluoroscoped and subsequent course may be determined by the picture visualized. At the unit there has been no recorded case of so-called "pleural shock," which is believed now to be actually air embolism. Aside from an occasional case of syncope associated with vaso-motor disturbances, similar in all ways to surgical shock, there have been no untoward reactions except for one case which displayed a bizarre form of central nervous system stimulation which was diagnosed as being of psychogenic origin.

Inasmuch as fluoroscopy 24 hours following an initial pneumothorax not infrequently shows the presence of what is apparently a greater amount of air than introduced, the belief has been advanced that a small, self-limiting traumatic pneumothorax, presumably from inadvertent puncture of parenchyma may be a concurrent phenomenon of most initial pneumothoraces. If this is so, it has been our experience that such extrusions of air from the lung into the pleural space are always self-limiting and do not produce fistulae, empyemata or any unwarranted degree of pleural effusion. Neither do they result in massive collapse or subcutaneous emphysema and they are usually unrecognized by the patient. The treatment of this condition is expectant only. The patient is fluoroscoped regularly and more air introduced only when the lung has re-expanded to an undesirable volume.

All patients undergoing collapse therapy should be fluoroscoped at least twice weekly, immediately preceding the regular pneumothorax refills. After a pneumothorax has been established satisfactorily, refills are administered only on the basis of the appearance of the collapse under the fluoroscope. About 50 per cent collapse is maintained, allowing, if possible, a selective collapse of the diseased parts with relative re-expansion of healthy lung. It is recommended that bronchoscopy be performed on every case in which collapse therapy is indicated. The value of this procedure in diagnosis and the determination of the condition of the air passages definitely outweighs any possible danger. The presence of endotracheal or bronchial disease considerably reduces the possibility of an effective pneumothorax and predisposes to atelectasis and check-valve cavity formation.

### *Effusion*

A clear, sterile fluid containing no bacteria frequently accompanies pneumothorax, and is usually confined to the costophrenic angle. In the absence of symptoms its presence can be ignored since it has no bearing on the success of the treatment.

### *Empyema*

Empyema is any collection of fluid in the pleural space containing bacteria. Etiological classification is as follows

- 1 Tuberculosis of the pleura
  - a Acute
  - b Chronic
- 2 Spontaneous pneumothorax
- 3 Spontaneous rupture of pleural adhesions
- 4 Bronchopleural fistula
- 5 Postoperative

The above conditions are interlocked, they may occur simultaneously or as the result of one another. Therefore, a discussion of the subject as a whole rather than individual consideration of these conditions seems indicated.

A second and third type of classification of empyema might be based on the types of fluid present and the degree of control of the underlying pulmonary tuberculosis and a fourth might be based on the reaction of the patient to the presence of the empyema, regardless of the cause of the condition.

The commonest cause of empyema is tuberculosis of the pleura, which may become associated with pneumothorax collapse at any time during the course of the therapy. The onset may be hidden and asymptomatic and the presence of the fluid discovered by radiography. Again there may be a systemic reaction of fairly sudden onset of chest pain, fever, and elevation of sedimentation rate. In every case a sample of the fluid should be removed for analysis, and intrapleural manometric readings should be taken. In tuberculous empyema, not complicated by an interruption of the continuity of the visceral pleura, there will be no marked immediate change in the configuration or collapse of the underlying lung and no marked shift to a positive pressure accompanying the development of the empyema. This will serve as a diagnostic sign by which the physician may differentiate this condition from those in which there is actual or potential secondary infection.

The treatment of this condition depends upon several factors such as the nature of the fluid, the type of collapse under the fluid and the degree of control of the disease in the underlying lung. No attempt is at first made to evacuate the fluid material. Pneumothorax is continued for as long as possible and according to the usual manometric readings. Many of these cases show a spontaneous resorption of the empyema without adverse effect upon the pneumothorax or the underlying lung. If, as occasionally occurs, the pleural space becomes completely obliterated by fluid,



and if the underlying pulmonary disease is well under control, the pneumothorax may be abandoned with the hope that the gradual expansion of the underlying lung in the presence of the slow resorption of the empyema will prove beneficial to the patient. If, however, the underlying lung is not under control and particularly if healthy lung is being jeopardized by contra-selective collapse, it would seem wiser to evacuate the fluid, allow the lung to re-expand, and consider thoracoplasty or other more permanent surgical procedure. If the onset of this type of empyema is acute, it will be found that the severer toxic symptoms frequently disappear within a week or so and the patient rests comfortably without inconvenience from the fluid in the chest. There is not infrequently found to be a marked subjective improvement in the patient following the development of fluid in the pleural space, particularly when that fluid almost or completely obliterates the space and the underlying lung is well controlled. Thick, purulent empyemas are more dangerous than serous or sero-purulent types, and one is more inclined to attempt reexpansion and obliteration of the pleural space with later thoracoplasty when pus is present. To avoid the development of a pleuro-cutaneous sinus or chest wall abscess, it is advised that needles be inserted into the pleural space as infrequently as possible.

### *Spontaneous Pneumothorax*

In spontaneous pneumothorax, we are faced with a condition which may bring about one or all of several undesirable complications. This may be small, self-limiting and relatively asymptomatic, but empyema, atelectasis, broncho-pleural fistula, subcutaneous emphysema and gross interference with vital capacity may result. The same holds true in the case of a spontaneous separation of pleural adhesions, though this latter condition can occur without the escape of air into the pleural cavity. The treatment should be expectant, and depends on the reaction of the patient and how well the condition cares for itself. Where there has been rupture of the visceral pleura, penicillin is administered immediately. The dosage is 20,000 units intramuscularly every 3 hours, and 50,000 units intrapleurally every day, until all chance or evidence of secondary infection has passed. Where the escape of air into the pleural space is sufficiently great to embarrass respiration, it is necessary to remove air. This is done preferably by reverse pneumothorax, and the intrapleural pressure should not be allowed to fall below atmospheric pressure. The increased pressure in the pleural space is an aid to the sealing off of the leakage from the lung, and is only reduced when absolutely necessary. If a large broncho-pleural fistula permits too much air to

escape, continuous decompression must be established. The need for this depends on interference with vital capacity or the presence of extending subcutaneous emphysema. Obviously, it is not necessary to refill the pneumothorax space unless the fistula becomes closed.

### *Broncho-pleural Fistula*

The diagnosis of broncho-pleural fistula is established by the instillation of 1 per cent aqueous solution of methylene blue into the pleural space and its subsequent recovery in the sputum. Such fistulae can close spontaneously, and should be given an opportunity to do this before surgical intervention is tried. The patient should lie on the affected side.

We have had no experience with attempts to obliterate the pleural space by oxygen lavage, oleothorax or detergent solutions. The same considerations as those given above apply to empyema following surgical invasion of the pleural space.

### *Atelectasis*

Atelectasis is a frequent companion to pneumothorax. It is probably present in some degree in almost all established pneumothoraces. The causes are either an obstruction of the air passages or the establishment of too great a collapse by external pressure. Obstruction of the passages may result from endobronchial disease, mechanical obstruction, or alteration and angulation of the bronchi as a result of alteration of intrathoracic anatomical relationships by pneumothorax and pleural adhesions. The condition might be anticipated and avoided by bronchoscopy prior to the institution of pneumothorax in some cases.

If cavitation occurs in an atelectatic area, it is quite likely to be of the type called "blocked," "tension" or "check-valve." An early estimate of the possibility of atelectasis and concurrent "blocked" cavity in the upper lobes may be made from the type of collapse following the establishment of an initial therapeutic pneumothorax. If the apex, when collapsing, falls away from the mediastinum, and collapses toward the hilus, atelectasis and "blocked cavity" are not likely to occur. If, on the other hand, the apex is adherent medially to the mediastinum and, on collapse, falls away from the lateral pleura towards the mediastinum, a mechanical angulation of the upper lobe bronchus is possible and the conditions under discussion can be produced.

The presence of extensive atelectasis is an indication for allowing partial or complete reexpansion of a collapsed lung. It is suggested that during this procedure, the operator may increase and decrease the collapse alternately for a few days to try to

"juggle" the lung to release any mechanical obstruction but it should be remembered that loss of use of a portion of the lung is occasionally the price paid for the healing of a tuberculous process therein, and it may be better to lose the use of a lobe if such loss results in the control of the disease

### *"Blocked Cavity"*

As noted above, "blocked cavity," may be associated with atelectasis, and in such case, the method of handling may be the same. It will occasionally be noted that cavities existing prior to pneumothorax, which take on the attributes of a "blocked cavity" under collapse therapy, may actually disappear if the lung is allowed to reexpand. Such cavities frequently increase in size when undergoing attempted collapse, and various methods have been tried in an effort to eliminate them. Restraining adhesions should be severed, if possible. Where the pull caused by inoperable adhesions at the apex and over the diaphragm maintains tension which interferes with adequate lateral collapse, phrenic crush may release such tension to a degree where the pneumothorax can produce an effective result. Failing the lesser measures, it has been the policy to allow reexpansion of the collapsed lung with a view to the performance of other surgical procedures, usually thoracoplasty.

### *Pleural Adhesions*

Pleural adhesions of varying size and location have been a complicating factor in something over 50 per cent of the established pneumothoraces. In the hands of the various members of the surgical staff, the operation of closed intrapleural pneumonolysis has given excellent results, and in almost every case where adhesions have been thought to interfere with collapse a thoracoscopy at least has been performed. We have also used temporary phrenic paralysis to release tension of adhesions with good results where pneumonolysis could not induce adequate collapse. The presence of pleural adhesions need not necessarily prevent an adequate collapse, as demonstrated by the disappearance of cavitation and the conversion of the sputum. If inoperable pleural adhesions definitely prevent adequate collapse, and interdict effective results from pneumothorax therapy, the lung should be reexpanded and more severe surgical procedures considered.

The accompanying tables indicate the occurrence of complications of collapse therapy. Table 1 indicates the various procedures associated with the institution and maintenance of collapse therapy over a 3 year period. Table 2 indicates the complications at present existing in patients now under treatment.

TABLE 1

Total number of procedures associated with the institution and maintenance of collapse therapy at U S Naval Hospital, Corona, Tuberculosis division, from open date, July 13, 1943 to May 1, 1946

Pneumothorax	34,464
Pneumoperitoneum	482
Aspirations	534
Bronchoscopy	212
Temporary Phrenic Nerve Interruption	233
Closed intrapleural pneumonolysis	764
Thoracoplasty (all types and stages)	259
Miscellaneous procedures	97

TABLE 2

		<i>Minimal</i>	<i>Moderately Advanced</i>	<i>Far Advanced</i>
Total number of Patients	582	106 (18.2%)	295 (50.7%)	181 (31.1%)
Pneumothorax	351 (60.2%)	13 (12.2%)	192 (65.1%)	146 (80.7%)
Empyema (all types)	98 (27.9%)	2 (15.5%)	43 (22.4%)	40 (27.5%)
Empyema, purulent	13 (3.7%)	0	3 (1.5%)	10 (6.8%)
Spontaneous Pnx	15 (4.2%)	0	5 (2.6%)	10 (6.8%)
Adhesions	200 (56.9%)	5 (3.8%)	100 (52.6%)	94 (64.4%)
Blocked Cavity	26 (7.4%)	0	10 (5.2%)	16 (10.9%)

TABLE 3

Table 3 shows the pneumothoraces, complications and more common surgical procedures performed on 1,024 consecutive patients whose histories were presented to the Board of Medical Survey for transfer, discharge, or retirement

	Total Patients		1,024
Pneumothorax	663 (67.7%)	Pnx abandoned	54 (8.1%)
Empyema (all types)	78 (10.2%)	Pneumonolysis done	273 (41.2%)
Empyema, purulent	10 (1.5%)	Aspirations	30 (4.5%)
Spontaneous Pnx	19 (2.9%)	Phrenic Crush	54 (8.1%)
Adhesions	357 (53.8%)	Thoracoplasty	29 (2.8%)

## SUMMARY

This paper sets forth the statistics of a large U S Naval Hospital Tuberculosis Unit with special attention to the occurrence and treatment of complications associated with Pneumothorax Therapy. Such complications are classified as those resulting from the

performance of pneumothorax and those resulting from coincident intrathoracic changes

An outline of suggested pneumothorax technique is presented with the suggestion that proper procedure will eliminate complications. In complications resulting from intrathoracic changes, it is suggested that the patient suffer a minimum of interference, that the condition of the patient and his response to his disease rather than the mere presence of fluid, adhesion or other complication be the determining factor for the institution of surgical procedures. The various complications are discussed as regards treatment, particularly with the aim of their elimination without the forced abandonment of the pneumothorax and the performance of more permanent surgical procedures.

Finally, tables of the collapse procedures instituted, the complications arising and the measures used to combat these in 1,048 consecutive cases are presented.

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### RESUMEN

Se presentan en este trabajo los datos estadísticos de las Salas para Tuberculosos de un gran Hospital Naval de los Estados Unidos, prestándole especial atención a la aparición y el tratamiento de complicaciones asociadas con la Terapia Neumotorácica. Se clasifican esas complicaciones en las que son ocasionadas por la ejecución del neumotórax y las que se deben a cambios intratorácicos coincidentes.

Se presenta un bosquejo de una técnica que se recomienda para la administración del neumotórax y se indica que el empleo de un procedimiento correcto eliminaría las complicaciones. En las complicaciones ocasionadas por alteraciones intratorácicas se sugiere que se someta el enfermo a un mínimo de intervención, que la condición del paciente y su reacción a la enfermedad, más bien que la mera presencia de líquido, adherencias u otra complicación, sea el factor determinante para la aplicación de procedimientos quirúrgicos. Se discuten las diferentes complicaciones en cuanto a su tratamiento, particularmente con el objeto de eliminarlas sin el abandono forzado del neumotórax y la ejecución de procedimientos quirúrgicos más permanentes.

Finalmente, se presenta una tabla de los procedimientos de colapso que se aplicaron, las complicaciones que sobrevinieron y las medidas que se emplearon para combatirlas en 1,048 casos consecutivos.

## Discussion

JOHN ROBERTS PHILLIPS, M.D., F.C.C.P.

*Houston, Texas*

It is good to discuss an old procedure Pneumothorax, a relatively simple surgical procedure, has controlled, by itself or with other types of surgery, more tuberculosis than any other operation

As a whole, the complications from it are relatively few, rather the complications are from the disease About fifty per cent have adhesions which require severance, sometimes requiring more than one attack in order to get sufficient separation, so that cavity closure will result If adhesions prevent closure of cavities, a phrenic crush may cause enough relaxation to effect closure The success of pneumothorax by itself, or with other procedures, occurs in a high percentage of cases, as shown by the low incidence of abandonment in Commander Gibbons' series Once it is seen that cavities will not close, it is useless to compress good lung and allow adhered diseased areas unaffected to remain expanded Consequently, the pneumothorax should be abandoned and other collapse measures or resection of the diseased portion resorted to

A complication that might be serious is tension in a spontaneous pneumothorax It can readily be relieved by putting a needle in the chest and connecting it by tubing under water Fluid in the chest may follow, which usually is not serious

Many cases of tension pneumothorax are seen particularly in civilian and war injuries It's management is easy once the diagnosis is made A careful study and selection of procedure in an individual case is essential for best results Complications will be less and less when this is adhered to

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## Discussion

JOSEPH ROSENBLATT, M.D., F.C.C.P.

*Los Angeles, California*

With the exception of cases of gross negligence when air is introduced into the chest in the absence of satisfactory manometric readings, immediate complications are the result of injury to the lung by the pneumothorax needle Since it is readily admitted that the lung is frequently punctured at the initial operation, and this is inevitable in cases where there is no free pleural space at the site of the puncture, it is reasonable to assume that the smaller and sharper the needle, the less will be the injury to

the lung With this idea in mind we have been using for many years a small sharp needle for the initial operation as well as for refills For approximately 25 years, I personally performed nearly all initial operations in three different institutions using this method without any serious mishap We use the same needle for injecting the anesthetic and the induction of pneumothorax Usually  $1\frac{1}{4}$  inch needle is long enough to reach the pleural space and the gage is 21, only slightly larger than the size used by others for anesthesia

It is being argued that a dull needle will push the lung out of the way and for this purpose various needles have been devised and some operators use large bore needles with the point filed off It is hard to believe that a needle that will penetrate the parietal pleura will spare the visceral pleura and in cases where the lung is adherent, obviously the lung cannot be pushed and it is bound to be punctured It seems to me that the lung retracts somewhat by virtue of its own elasticity when air penetrates into the pleural space, and this will happen whether we use a sharp needle or a dull needle At any rate, those who are afraid of a small sharp needle are using it anyhow when injecting the anesthetic, and that is practically the entire operation in our method

As far as later complications are concerned, it goes without saying that if fluid develops and the pneumothorax is ineffective, it is best to abandon the pneumothorax, allow the lung to re-expand, and perform a thoracoplasty later But in cases of effective pneumothorax, I do not believe it wise to abandon the pneumothorax merely because of the development of fluid, even if the fluid contains tubercle bacilli In many instances the fluid will clear up after several aspirations and air replacements and it is possible to continue the pneumothorax

Cases with frank empyema present an entirely different problem but here too, if the lung condition is not under control, the indications are to get the patient in good enough condition to stand a thoracoplasty But in such cases where the pneumothorax has been effective and the only problem is the treatment of the empyema, the situation is different If we are to believe various statistical reports, we would assume that empyema cases are entirely hopeless unless they are subjected to surgery There are reports of 90 to 100 per cent mortality in non-operative cases I am inclined to believe however, that the vast majority of patients died from progressive tuberculosis rather than from the empyema Our own experience has not been that bad In 1934, I reported a series of 21 cases of empyema treated conservatively, with 11 clinical recoveries These patients were well at least five years after discharge from the sanatorium

More recently, I reviewed 51 patients from the Los Angeles Sanatorium that were treated by me personally in a conservative manner. Of these 51 patients, 15 were working for at least two years. Eleven had their collapsed lung reexpanded and the empyema cavity closed. Three had a dry pneumothorax which was continued. Twenty were dead, but in only two or three cases could the empyema be considered the major cause of death. The remainder, were unimproved.

If these figures prove anything, it is that when considering surgery in a case of tuberculous empyema, it is a mistake to approach the problem with the idea that the patient is doomed if he does not submit to surgery. Whether or not our statistics would have been better had we employed surgery more frequently, it is impossible to state. But, given a patient with a large pneumothorax pocket, with a small amount of pus, whose lung condition is under control and who is doing well clinically, I found it difficult to advise the multiple surgical operations recommended for the obliteration of the pneumothorax. I doubt whether the patient would benefit much by converting a large pneumothorax space containing a small amount of pus to a small pneumothorax with pus and possibly a draining sinus.

Some statistics about patients who were subjected to surgery are exceptionally good, showing as much as 60 to 80 per cent cures, but obviously, these were selected risks because it is hard to find any group of cases without any complication in whom we can obtain such a large number of cures.

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# Heparin in Empyema

## Report of a Case

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In the treatment of pulmonary tuberculosis few complications are more perplexing than a mixed infection empyema. Very often aspiration is extremely difficult if not impossible because of the formation of a gelatinous substance within the cavity which often forms into long fibrinous strings or clots. These block the needle when aspiration is attempted. Occasionally one may see before the fluoroscope long strings of fibrin hanging from the parietal pleura and swinging in the fluid as the patient is flexed from side to side. In infections of the pleural cavity following pneumonia, cases are seen where even after a rib is resected and a tube inserted there is no drainage until the tube is removed and long strips of fibrin removed with a forceps. Howlett and Lester<sup>1</sup> recently reported two cases of Staphylococcus infection of the pleura in tuberculous patients successfully treated by penicillin. They state that in one case they were only able to aspirate once.

R. B., a girl twenty-one years of age, had been a patient in our sanatorium for eighteen months with a tuberculous involvement in the apex of the left lung. She had a satisfactory pulmonary collapse, although the base of the lung was adherent to the chest wall. In January 1946, she was allowed to attend business college in a neighboring city but returned for refills at intervals of two weeks. On March 14th, while typing with a heavy machine she experienced a sharp pain in her left side and a severe catch on breathing. She remained home in bed but her temperature arose to 103° and on March 18th she was returned to the sanatorium. X-ray films of her chest showed an increased collapse and some fluid forming at the bottom of the free pleural cavity. Penicillin was started with 10,000 units every three hours given parenterally. Her temperature went to 104° and she had several severe epistaxes. By March 23 the fluid had greatly increased and she complained of pressure and shortness of breath. Aspiration was then decided upon. Only 20 cc of a thick yellow fluid was withdrawn as the needle was continually blocked and had to be withdrawn several times during the aspiration of this small amount. This fluid clotted in a glass to the consistency of jelly within a few minutes after its aspiration. A culture showed a pure staphylococcus infection. The following day aspiration was again tried with a much larger needle but with no better results.

On March 25, after aspirating 2 cc of fluid, 2½ cc of heparin in 10 cc of saline solution was injected into the pleural cavity and allowed to remain for two hours. The patient was instructed to change her position

every fifteen minutes. At the end of this time 200 cc of fluid was aspirated with no obstruction or difficulty of any kind and replaced by 10,000 units of penicillin. The fluid withdrawn did not clot or thicken when left standing in a glass receptacle for several hours. Her blood clotting time (test tube method) was eight and one half minutes before injection of the heparin and the same when the heparin was withdrawn. From March 25th to May 25th the pleural cavity was aspirated daily, washed with normal saline, and 10,000 units of penicillin injected through the aspirating needle and allowed to remain. The intermuscular injections of 10,000 units every three hours started on March 19th, were also given until April 14th when they had to be discontinued because of the development of a severe urticaria accompanied by an arthritis in her right shoulder and elbow.

By May 25th the pleuritic fluid had decreased to such a small amount that aspiration became impossible. The urticaria and arthritis having disappeared by this date, the intermuscular injections of 10,000 units of penicillin every three hours were again given. Patient also received one capsule of benadryl orally each day. These were continued until June 15th without any reappearance of the urticaria or arthritis. At this date all treatment was discontinued. Three cultures of the aspirated fluid taken between May 20th and 25th had been negative to staphylococcus. Her temperature has been normal since May 15th and she has regained all weight lost during the first weeks of her secondary infection. Her lung is expanding satisfactorily and a very small pneumothorax remains containing not over 5 cc of fluid. Patient has no sputum and the erythrocyte sedimentation rate is normal.

### SUMMARY

Few conclusions can be drawn from one case but it does seem that heparin can safely be used in the pleural cavity without effecting the blood coagulation time of the patient. Guernar Bauer<sup>2</sup> in his splendid article "Heparin in Venous Thrombosis," reported on the use of very large doses of heparin intravenously without any ill effects. Lehman and Boys<sup>3</sup> injected 120 cc of heparin in the abdomen following operations to prevent adhesions. Undoubtedly much larger amounts of heparin can safely be used in empyema cases than was used in the case just reported and allowed to remain longer before being withdrawn. It may also be to advantage to use it soon after the infection appears with a view of preventing adhesions which anchor the lung and retard or prevent its expansion.

### RESUMEN

No es posible sacar muchas conclusiones basadas en un solo caso, pero parece que sí puede usarse sin peligro la heparina en la cavidad pleural sin afectar el tiempo de coagulación sanguínea del paciente. Guernar Bauer,<sup>2</sup> en su espléndido trabajo titulado "La Heparina en la Trombosis Venosa," informó sobre el uso de grandes dosis de heparina por la vía intravenosa sin mal efecto

alguno Lehman y Boys<sup>3</sup> inyectaron 120 cc de heparina en el abdomen después de operaciones, con el fin de evitar la formación de adherencias. Es indudable que en casos de empiema pueden usarse sin peligro cantidades mucho más grandes de heparina que la que se usó en el caso que se acaba de presentar, y se pueden dejar en la cavidad pleural por más tiempo antes de extraerlas. También puede ser conveniente usar la heparina poco después de aparecer la infección, a fin de evitar la formación de adherencias que sujetan el pulmón y demoran o impiden su expansión.

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# Cor Pulmonale

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Twenty-five years ago cor pulmonale was usually taken to indicate the right-sided heart failure associated with emphysema or those forms of congenital heart disease in which the right ventricle bore the chief burden. Over the intervening quarter century there has developed a broadened concept of the term "cor pulmonale," so that it now means any type of heart disease associated with, or resulting from, obstruction, acute or chronic, in the pulmonary circulation. We now have *acute cor pulmonale* which most often results from sudden obstruction in the pulmonary circulation, either from embolism or thrombosis, and which may also be used to designate acute forms of right heart failure from any cause. There is in addition the much commoner *chronic cor pulmonale* which occurs in a number of cardiac and pulmonary disorders in which there is strain on the right ventricle. Frequent among these is mitral stenosis, in some cases of which the best examples of chronic right heart failure develop, as evidenced by increasing venous congestion, enlargement of the liver, and peripheral edema. Other examples of chronic cor pulmonale occur in those cases of congenital heart disease in which right ventricular failure dominates the clinical picture. This type of heart disease also is found in those rare instances of pulmonary arterial or arteriolar sclerosis, some of which are called Ayerza's disease. Further examples of chronic cor pulmonale are to be found in certain chronic lung conditions, especially those associated with fibrosis. This latter group includes emphysema, bronchiectasis, pneumoconiosis, especially silicosis, and pulmonary tuberculosis, in all of which interference with the pulmonary circulation may occur to a greater or lesser extent.

Our knowledge of the lesser circulation is limited and we must depend on animal experimentation to provide such information as we have. From studies on the dog it is assumed that the pressure in the pulmonary artery is about one-sixth that in the aorta, that means about 18 to 20 mm of mercury. The output of the right ventricle is the same as the left ventricle, or 3 to 4.6 litres per minute, or in the neighborhood of 50 to 60 cc per beat. The total capillary surface in the lungs is estimated at 140 square metres.

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and the vessels show a high degree of distensibility. The capacity alters with changes in intrathoracic pressure and is of course very sensitive to change in the relation between the minute volume output of the right ventricle and the resistance on the left side of the circulation.

From a clinical standpoint estimation of right ventricular function depends on a correlation of symptoms, physical signs and laboratory tests. The symptoms are those of dyspnea, weakness, cough, hemoptysis, the signs are increased venous congestion with prominent or pulsating cervical veins, enlarged liver, and edema, and in chronic cases, cyanosis and clubbing of fingers and toes, and ascites. The laboratory tests may reveal a polycythemia, and x-ray films show right ventricular enlargement. In this connection it is important to remember that early dilatation or hypertrophy of the right ventricle may escape roentgenological detection, particularly if associated with emphysema with flattening of the diaphragm—the “drop” heart. The electrocardiogram usually shows right axis deviation. Measurement of venous pressure which is a simple bedside procedure, will usually show a considerable elevation over the normal figures of 40 to 80 mm of water. Circulation time tests are also helpful, the right ventricular time being measured by the injection of 5 min of ether in 1 cc normal saline into an arm vein. The time taken for the ether to reach the lungs is normally 3 to 9 seconds, and in right ventricular failure this is much increased.

Some recent experimental work by Eaton, Czebrinski and Smith,<sup>1</sup> if confirmed, raises interesting speculations. These observers have found that as an immediate reaction to systemic arterial blood loss there is pulmonary hemorrhage and edema, which causes an increase in peripheral venous pressure as well as an increase of pressure within the pulmonary artery. This increased venous pressure is developed within 30 to 40 minutes of the acute blood loss and reaches its peak in 50 to 60 minutes. Thereafter there is a gradual decline to less than normal levels. They point out the obvious danger of the administration of intravenous fluids during this period of increased venous pressure, and suggest that venesection during this early period might on occasion be life-saving.

Before leaving this part of our discussion we cannot fail to comment on the impunity with which the thoracic surgeon can ligate a pulmonary artery, even the main right or left branch, and compare that procedure with the devastating effect produced by sudden occlusion of the same vessel by embolus or thrombus. This is but one of the many challenging propositions that await solution.

Of the acute forms of pulmonary artery involvement, embolism is probably the commonest, though spontaneous intravascular

thrombosis does occur. The most frequent source of the embolus is a thrombus in the right auricle or in a peripheral vein. Embolism may involve a small branch of one pulmonary artery and the symptoms produced may be mild and transitory, or a larger branch may be occluded with severe shock and more prolonged symptoms. Sudden blocking of the pulmonary artery itself is usually fatal. The findings in these various kinds of pulmonary embolism are of course quite different, the clinical picture is too well known to need detailed description here. There is the acute blocking of a small branch, characterized by sudden pain in the chest, cough, and hemoptysis which in its typical form can be diagnosed by the intern or nurse. What is less well known is that pulmonary embolism can occur without chest pain (which is really only an indication of pleural involvement), without cough, and in some cases without hemoptysis. It is the atypical cases which will only be discovered by a constant clinical awareness of this frequent pulmonary complication. In those cases in which a larger branch of the pulmonary artery is suddenly occluded *shock*, with rapid pulse, drop in blood pressure, extreme dyspnea, and cyanosis, may develop very suddenly. Some of these may even show anginal or substernal pain. Where the occlusion is high sudden death may occur. The electrocardiogram has proved of value for diagnosis in some of these cases. The cause of the shock, the cardiographic changes, and death in these cases, has been and still is the subject of a great deal of study. As pointed out by Murnaghan, McGuire and White,<sup>3</sup> pulmonary embolism and acute cor pulmonale are not synonymous. In other words, sudden occlusion of a branch of the pulmonary artery may occur without any evidence of right heart strain. They point out that acute cor pulmonale is more apt to occur in those instances of pulmonary embolism associated with shock. While it is true that in acute cor pulmonale the electrocardiographic changes may be characteristic, if we take all cases of pulmonary embolism, many will show no changes in the cardiogram at all, or only minor and nondiagnostic deviations from the normal. In acute cor pulmonale these observers have described the following changes in the tracings as suggestive: right axis deviation, deep ST, S-T<sub>1</sub> segment may be low, S-T take off low in Lead Two, T<sub>2</sub> flat or inverted, Q<sub>3</sub> moderately deep, T<sub>3</sub> inverted, T<sub>4</sub> diphasic or inverted. The limb lead changes are suggestive of posterior infarction. Others,<sup>3,4</sup> have stressed the importance of multiple precordial leads, especially those from the right side of the chest, the right pectoral lead. In these leads the T wave in acute cor pulmonale is inverted and remains inverted longer than in the usual precordial lead, IV F. The whole subject of the heart in pulmonary embolism has been well discussed by Currens and

Barnes<sup>5</sup> They presented 307 autopsied cases of pulmonary embolism, of which 70 per cent occurred in surgical, 20 per cent in medical, and 10 per cent in cardiac patients They made a special microscopic study of thirty cases and found five that showed significant changes, four showed myocardial infarction without evidence of occlusion or thrombosis of the coronary arteries, one showed a recent coronary thrombosis In another there was infarction resulting from prolonged shock in which there was definite anoxia, persistent cyanosis, and decreased coronary blood flow In two others electrocardiographic changes had been demonstrated but the myocardium showed no changes

The cause of death in pulmonary embolism is not known but various theories have been advanced, including a pulmono-coronary reflex in which coronary spasm, with or without cardiac infarction, might occur Currens and Barnes<sup>5</sup> suggest that death is due to the onset of ventricular fibrillation and think that the angina that sometimes occurs after pulmonary embolism is due to coronary spasm They stress the importance of the fall in arterial blood pressure with the increase in heart rate, the rise in pressure in the right auricle with resulting increase in pressure on the coronary sinus, and the decreased flow of blood to the muscle of the right ventricle In the latter connection they point out that since over 90 per cent of the blood supply to the walls of the right ventricle is returned by way of the Thebesian veins, a rise in intraventricular pressure will impede the coronary circulation in the right ventricle

In valvular heart disease cor pulmonale may occur if the chief strain is on the right ventricle The commonest example of this sort of cor pulmonale is that found in some cases of mitral stenosis In these patients there is usually dilatation of the left auricle with resulting increase in pressure in the pulmonary veins, which leads to obstruction of the lesser circulation with right ventricular hypertrophy The symptoms result from diminishing vital capacity and peripheral venous congestion There is early rise in venous pressure and circulation time, arm to lung, is greatly increased, later all the peripheral evidences of chronic passive congestion, hepatomegaly, edema of extremities, ascites, and cyanosis appear

Of the causes of cor pulmonale that have their origin in the pulmonary arterial system itself, embolism and thrombosis produce acute symptoms, whereas pulmonary arteriolar sclerosis produces chronic cor pulmonale These cases, some of which are so-called Ayerza's disease, and others which may result from congenital cardiac anomalies which cause an increased pulmonary blood pressure with resulting arterial and arteriolar sclerosis, are

not common Ayerza's original description attributed the changes in the pulmonary arteries to syphilis There are in addition other causes for pulmonary arteriolar sclerosis, among which must be included those conditions in which an increased pressure in the pulmonary artery is long maintained These patients present a marked degree of cyanosis, are called "black cardiacs," and suffer an increasing disability from right heart failure, hemoptysis may also be common

The cases of congenital heart disease that show cor pulmonale are those in which the abnormalities are such as to throw a constant and an increasing strain on the right heart These usually fall in the Abbott group III,<sup>6</sup> the cyanosed group, and are clinically characterized by cyanosis, clubbed fingers and toes, increased venous pressure, and increased right ventricular (arm to lung) circulation time Examples of this type of congenital heart disease are seen in cases of pulmonary stenosis, particularly those in which the narrowing is of considerable degree and is associated with a defect in the septum The rarer cases of the Tetralogy of Fallot show a chronic cor pulmonale with right ventricular hypertrophy, resulting from pulmonary stenosis, defective intra-ventricular septum, and dextro-position of the aorta Interest in pulmonary stenosis has increased because of the recent work of Blalock and Taussig,<sup>7</sup> suggesting a surgical method of relieving the cyanosis in these cases by the anastomosis of a branch of a systemic artery to the pulmonary artery

There is another group of diseases which can produce a chronic form of cor pulmonale These are the chronic diseases associated with more or less fibrosis of the pulmonary tissue, capable of causing obstruction to the blood flow through the lesser circulation Included in this group of disorders are emphysema, bronchiectasis, pneumoconiosis, the commonest form of which in this area is silicosis, and pulmonary tuberculosis

Emphysema, which may be the senile type or may be associated with bronchial asthma or chronic bronchial infection, has been the subject of much argument The older clinicians coined the phrase "emphysema heart" and by this they meant a form of chronic cor pulmonale On the other hand we all know that emphysema may exist for years with little evidence of heart strain of any sort, in fact, many of the most typical cases of chronic emphysema show small hearts The x-ray evidence of right heart enlargement may be obscured by the emphysema itself with resulting flattening of the diaphragm, producing the so-called "drop heart" which may appear small in the film but actually show right ventricular hypertrophy It is probably true that this impression is enhanced by the fact that when failure develops and enlarge-



ment of the right ventricle might be found, these patients fall rapidly and die from a non-recurrent form of heart failure in a short time. The studies of Parkinson<sup>8</sup> have shown that in emphysema the strain and resulting enlargement affect the outflow tract from apex of the right ventricle to pulmonary artery. Griggs and his associates<sup>9</sup> found evidence of right ventricular enlargement in 30 per cent of autopsies on all patients with emphysema and evidence of right ventricular enlargement in 28.9 per cent, and death from congestive failure in 22.3 per cent of patients dying with *only* pulmonary emphysema. It must be obvious therefore that there is an "emphysema heart" even though it is not a clinically common form of heart disease.

As to the role of other forms of chronic pulmonary disease in the production of chronic cor pulmonale, Griggs and his associates<sup>9</sup> found that chronic bronchitis alone was a negligible factor. On the other hand, where bronchiectasis occurred, they found that 16 per cent of all cases showed right ventricular hypertrophy, and where bronchiectasis was the only pulmonary disease, right ventricular enlargement occurred in 8.8 per cent, and the patient died from congestive heart failure in 4.4 per cent. This is added reason, in selected cases, for the early and adequate surgical treatment of bronchiectasis. In pneumoconiosis they found right ventricular hypertrophy in 4.3 per cent of all cases, and where the pneumoconiosis was the only pulmonary lesion they found right ventricular enlargement in 5.4 per cent, and death from congestive failure in 5.0 per cent.

*Silicosis*, which is a comparatively frequent clinical finding in this area because of the number of men engaged in hardrock mining, produces a widespread pulmonary fibrosis. These patients are susceptible to tuberculosis and this complication is common. Clinically, chronic cor pulmonale is not often found as a result of silicosis alone. Study of the chest x-rays of a large series of cases of silicosis by Vrooman<sup>10</sup> shows that cardiac enlargement is rare. It may be that some of these patients will ultimately die of right heart failure and show at autopsy right ventricular enlargement, but during life such right-sided heart involvement may not be apparent.

The relation of pulmonary tuberculosis to cor pulmonale is not clear. As in chronic emphysema, most patients with pulmonary tuberculosis, even those showing extensive pulmonary fibrosis, are more apt to show small rather than large hearts. It is of interest to note that Griggs<sup>9</sup> did find evidence of right ventricular enlargement in 3.75 per cent of cases of pulmonary tuberculosis, and thought that 1.8 per cent died of congestive heart failure resulting from chronic cor pulmonale. While these percentages are small

the much greater incidence of tuberculosis in the general population means that this disease must be considered among the causes of cor pulmonale

### *Diagnosis*

The question of the diagnosis of cor pulmonale, in general, may be a more or less academic one. There is one form of acute cor pulmonale in which the differential diagnosis from coronary thrombosis may be important. As has been frequently pointed out, *awareness* of the ever present possibility of sudden pulmonary embolism is one of the most important factors in the differential diagnosis. There are instances in which because of sudden collapse, with tachycardia, fall in blood pressure, cyanosis, and respiratory distress, the picture of acute cor pulmonale from pulmonary embolism may closely simulate cardiac infarction. Anginal pain can also occur. The electrocardiographic findings in some of these instances may be the only means of differentiation. Fortunately treatment is not so dissimilar as to make early distinction between these two possibilities crucial. Oxygen will benefit both. Papaverine intravenously along with the early use of atropine is indicated in pulmonary embolism, and morphia in cardiac infarction. Both should benefit from aminophylline by vein.

Since cor pulmonale seems to be increasing and is certainly a more frequent diagnosis now than years ago, some thought should be given to those measures that may be adopted to prevent this disorder. It is obvious that we cannot prevent *all* the conditions that lead to cor pulmonale. In discussing the prevention of pulmonary embolism it is important to remember that this may develop in surgical or medical patients. In the former early ambulation, leg exercises, early ligation if evidence of peripheral venous thrombosis is discovered, are the important measures. The question of venography should receive more consideration since it may be the only method by which a silent peripheral venous thrombosis, phlebothrombosis, may be discovered. Actual surgical removal of the embolus from the pulmonary artery, while occasionally attempted, is not practical.

In medical patients the approach is somewhat different. In spite of all the recent papers decrying rest in bed, there are some medical conditions in which long periods in bed are necessary. Fortunately, not all patients confined to bed develop silent venous thrombosis from which pulmonary embolism may occur. There are instances, however, in which, with patients confined for periods of several weeks, peripheral venous stasis with thrombosis does occur. These patients may have an alteration in the coagulability of their blood, and it is for them that preventive meas-

ures should be considered. The routine use of the anti-coagulants, dicoumarin or heparin, in bed patients has its advocates, though the value of this method of treatment must await controlled studies. Where evidence of venous thrombosis has developed the anticoagulants or ligation, or both, may be indicated. Venography to establish the patency of the venous system, followed by regular and orderly leg exercises should certainly be of value in patients lying still in bed. In dealing with the chronic pulmonary disorders that produce cor pulmonale, prevention is in part to be found by earlier surgical treatment of the affected portions of the lung.

### SUMMARY

There has been attempted a description of right heart failure called cor pulmonale which, while in the chronic forms, not always a clearly defined clinical entity, is much commoner than generally realized. Chronic cor pulmonale may present the clinical picture of general or "whole" congestive heart failure, although there are to be found examples of pure right ventricular failure. It is acute cor pulmonale which deserves most attention because in some cases it may be preventable. It may be confused with cardiac infarction and the differential diagnosis, including further study of the electrocardiographic changes, should receive more attention. The increase in the clinical and experimental investigation of venous thrombosis, both phlebothrombosis and thrombophlebitis, should add to our knowledge of methods of preventing pulmonary embolism. As our clinical awareness of this form of heart trouble increases, we will discover more frequent examples of acute cor pulmonale.

### RESUMEN

Se ha intentado describir la insuficiencia cardíaca derecha, llamada cor pulmonale, cosa que, aunque no sea siempre clínicamente bien definida en sus formas crónicas, es mucho más común de lo que generalmente se supone. El cor pulmonale crónico puede presentar el cuadro clínico de insuficiencia cardíaca congestiva general o "entera," aunque existen ejemplos de insuficiencia del ventrículo derecho solo. El que merece más atención es el cor pulmonale agudo, porque en algunos casos puede ser evitable. Es posible confundirlo con el infarto cardíaco y, por lo tanto, debe recibir más atención el diagnóstico diferencial, incluyendo un estudio más detallado de las alteraciones electrocardiográficas. El acrecentamiento en la investigación clínica y experimental de la trombosis venosa, tanto flebotrombosis como tromboflebitis, se debe añadir a nuestro conocimiento de los métodos de evitar la embolia pulmonar. Con el aumento de nuestros conocimientos clínicos sobre esta forma de

cardiopatía, descubriremos con más frecuencia ejemplos de cor pulmonale agudo

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# A Technic for the Automatic Maintenance of Constant, Controlled Pneumothorax\*

## (A Preliminary Report)

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In the administration of artificial pneumothorax re-expansion of the lung may dictate very frequent refills. It has been shown by Pinner,<sup>1</sup> Matsuzawa,<sup>2</sup> and others that absorption of intrapleural air begins very shortly after the time of its introduction. When there is a sufficient amount of normal, elastic lung tissue, a large proportion of this air may be absorbed in the first 24 hours. Consequently, early in pneumothorax, in most bilateral pneumothorax cases, and in such cases where pathology does not involve large portions of the lung parenchyma, there is a very marked tendency to rapid re-expansion. This necessitates complete inactivity of the patient since muscular activity increases the rate of re-expansion and necessitates frequent needling of the chest.

In an institutionalized patient this is not a serious objection, however, there are places and there are circumstances when it is difficult to keep a patient at bed rest, and it is often difficult to give pneumothorax refills with the frequency required to maintain adequate collapse. For this reason it has long been the wish of chest men that an apparatus be designed that would introduce air as required to prevent rapid re-expansion of the lung and make repeated chest punctures unnecessary. Such an apparatus must maintain the intrapleural pressure desired, and the type of material introduced into the chest must not cause irritation, infection, or other undesirable complications.

### *The Pneumothorax Pressure Regulating Device*

The machine, shown in Figure 1, is composed of magnesium alloy and weighs less than one pound. It has a diameter of 3½ inches and stands about 3 inches high.

Essentially, the apparatus is composed of two chambers, separated by a rubber diaphragm (Fig. 2). Chamber A is in direct

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communication with air Chamber B is airtight and communicates directly with the intrapleural space The rubber diaphragm C separates the two chambers and is made airtight except where a needle valve (D) pierces the diaphragm A seal is effected at this point by having the needle valve impinge on a seat of soft rubber (E) An airtight L tube (F) communicates with Chamber (B) The vertical arm fits the lumen of a thick-walled rubber tube which eventually is connected to the intrapleural catheter The horizontal arm is covered with a snugly fitting rubber cap which may be removed so that a water manometer may be placed in series to read chest pressures Impinging upon the diaphragm on the chamber B side is a spring of known strength (G) The pressure which the spring exerts on the diaphragm is controlled by turning a screw (H) This portion of the machine is rendered airtight by the addition of a snugly fitting sleeve of rubber (I)

It can be seen that by varying the pressure exerted by the spring (G), the summation of intrapleural pressure and spring pressure on the chamber B side of the diaphragm can be made to equal

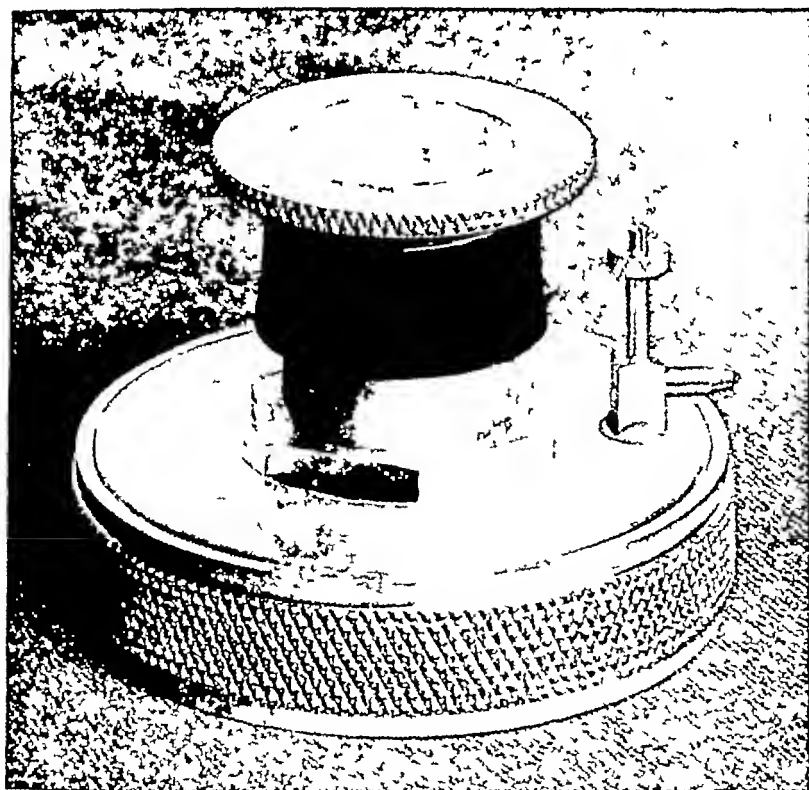


FIGURE 1 The constant pressure regulating device The instrument is quite light, being made of magnesium alloy

atmospheric pressure, which exerts its force on the chamber A side of the diaphragm. When such a balance ensues, the needle valve (D) is seated firmly in the rubber cushion (E), and the two chambers are completely separated. Chamber A communicates with air, and chamber B with the intrapleural space. When air is absorbed by the pleura, the intrapleural pressure decreases. Now the sum of forces pushing on the "B" side of the diaphragm is *less than* atmospheric pressure. The needle valve moves away from its seat, and air moves through it into chamber B and into the intrapleural space until the pressures are again equal on both sides. The valve then seats and closes.

It must be made clear that the machine is set to control an *inspiratory* pressure. During expiration the summation of forces in Chamber B will be greater than atmospheric pressure (Chamber A pressure). Thus, the valve will always stay closed until on inspiration the pressure exceeds the negative pressure adjusted for. At this point atmospheric pressure will force the needle valve away from the rubber cushion. Air will move into chamber B until the intrapleural pressure falls below the set value of negativity.

The spring tension, and thus the intrapleural pressure, may be set in the following fashion. A large syringe is attached to the vertical arm of the L tube (F) and the water manometer to the horizontal arm. Air is withdrawn from chamber (B) by the syringe. The difference of gas pressure between chambers A and B is made up by the spring pressure. Thus, when the water column in the

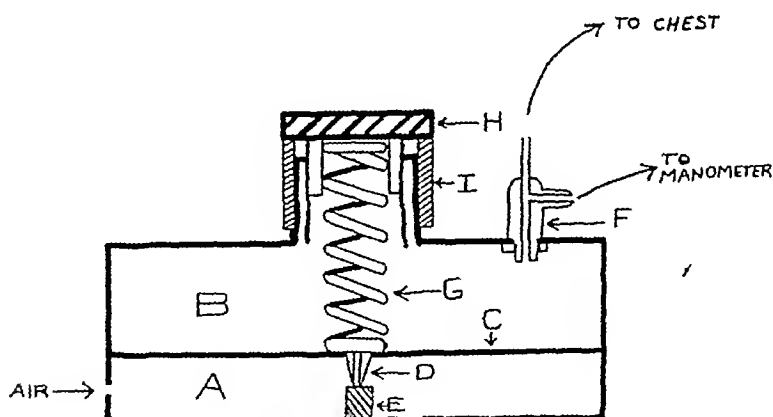


FIGURE 2 Cross section of the constant pressure regulating device—(a) The lower chamber which communicates with air—(b) The upper chamber which is airtight and communicates with the intrapleural space—(c) The rubber diaphragm—(d) A small needle valve which pierces the diaphragm and allows air to move from chamber A to chamber B—(e) A small rubber cushion on which the needle valve sits—(f) L tube on arm of which leads into the chest the other may be connected to a water manometer for pressure readings—(g) Calibrated spring which rests on the diaphragm—(h) Gnarled screw which when turned will increase or decrease spring tension—(i) Rubber cuff

manometer stabilizes at a negative pressure, a reading of the difference between intrapleural (B) and atmospheric (A) pressure is obtained. This is the precise pressure exerted by the spring, and may be read directly. So, if a *negative* intrapleural pressure of -10 cm (i.e., 10 cm of water less than atmospheric pressure), is desired, one need only to adjust the tension of the spring (G) by the screw (H) until a steady manometer pressure of -10 cm is registered. It is possible to secure a range from 0 to -35 cm of water pressure.

### *The Chest Catheter*

An investigation soon revealed that rubber, metal, or woven catheters were far too irritating when left in situ in tissue. Of the available plastic materials studied, methacrylate and polyvinyl tubing were found unacceptable. Polyethylene seemed to answer the purpose quite well.

Polyethylene is a long-chained polymer of ethylene with a molecular weight of about 18,000. It was produced commercially in 1943.<sup>3</sup> The tubing used in our first two cases had an internal diameter of 22 gauge and an outside diameter of about 16 gauge. We then changed to a larger tubing which had an internal diameter of 17 gauge and an external diameter of 14 gauge.\* It is a slightly cloudy, tough, flexible material, easily sterilized in 70 per cent alcohol solution. It cannot be heat sterilized. When samples of the tubing were left in situ in the thoracic cage of dogs for periods up to one month, there was no gross evidence of tissue irritation either along the catheter tract or in the pleural cavity. Microscopic studies were not done. The evidence of the low tissue irritation of polyethylene is supported by several other investigations. Meyer<sup>4</sup> used polyethylene for intravenous catheterization and reported minimal tissue response. Ingraham, Alexander and Matson<sup>5</sup> reviewed the use of plastics in surgery, and more recently conducted an exhaustive study of tissue reaction to polyethylene.<sup>3</sup> They feel this plastic is by far the least irritating to tissue. With this information it was felt sufficient evidence had been accumulated to introduce a polyethylene catheter into the intrapleural space of the human.

### *Technic*

The technic does not differ markedly from that of pneumothorax. A 14 gauge needle which has been threaded through a flat rubber disc is inserted into the pleural space. Through the lumen of the needle the special polyethylene catheter is inserted.

\*Polyethylene tubing known as "aeroflex" was kindly furnished by the Anchor Plastic Corp., 533-541 Canal Street, New York, New York. The specific size of the larger tubing is 55" x .995".



until 5 cm to 6 cm of the catheter lies within the pleural space, and by pushing down gently on the catheter and withdrawing the needle, the catheter is left in the chest after the needle has been withdrawn

The rubber disc through which the catheter is now passing is applied to the surface of the skin and affixed there by cellulose tape (Fig 3) The catheter is fixed firmly in position, and a blunt 17 gauge needle is gently threaded into the lumen at the distal end of the catheter A rubber tubing is attached to this needle by a luer lock, and the distal end slipped over the vertical arm of the L tube on the apparatus The whole apparatus and tube may be placed in a pocket, pinned to an article of clothing, or hung on a belt No special precautions need be taken

### CASE REPORTS

*Case 1* ES A 19 year old white female Pneumothorax was established on the right on October 7, 1946 and left pneumothorax induced on June 16, 1947 Because of the presence of lower lobe cavitation on the right, it was necessary to maintain adequate collapse not only in the right upper lobe but also in that portion of the right lower lobe that contained the cavity This was found to be extremely difficult to do and required pneumothorax refills every 3 or 4 days Since the patient was also receiving pneumothorax on the left once a week, this made a rather complicated schedule This program had been in effect for the past 4 months without any noticeable improvement in the ability of the pneumothorax to maintain collapse of the right lung

On September 2, 1947 a catheter was inserted into her chest and attached to the constant pressure apparatus Figures 4a, b, c and d shows the maintenance of pneumothorax space during the 16 day period As may be observed, the space actually increased in size in this period It is to be noted that this patient did not remain on complete bed rest, and that previously her lung showed almost complete re-expansion of the lower lobe in 4 days There was no reaction in the pleura, on the skin or in general No elevation of temperature occurred nor were symptoms

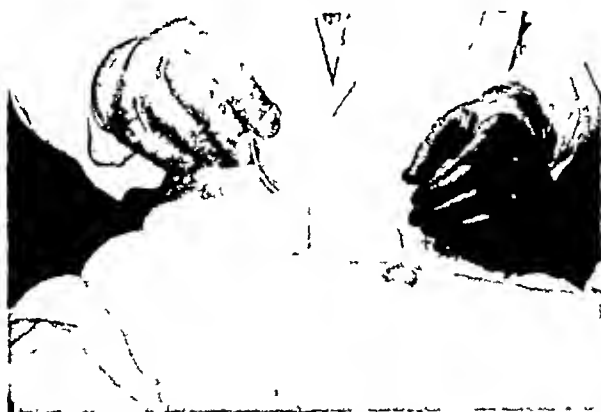


FIGURE 3 The polyethylene catheter may be seen running through the rubber disc and entering the chest wall

noted by the patient. Pressure readings taken during this period showed a constant inspiratory pressure of  $-8$ , the level at which the apparatus was set.

*Case 2 R.Mc* A 31 year old white female. Right-sided pneumothorax was established on August 5, 1946 and left pneumothorax on February 5, 1947. This case is almost a duplicate of Case 1 in pathology, indications, and complications. On September 2, 1947 a catheter was inserted

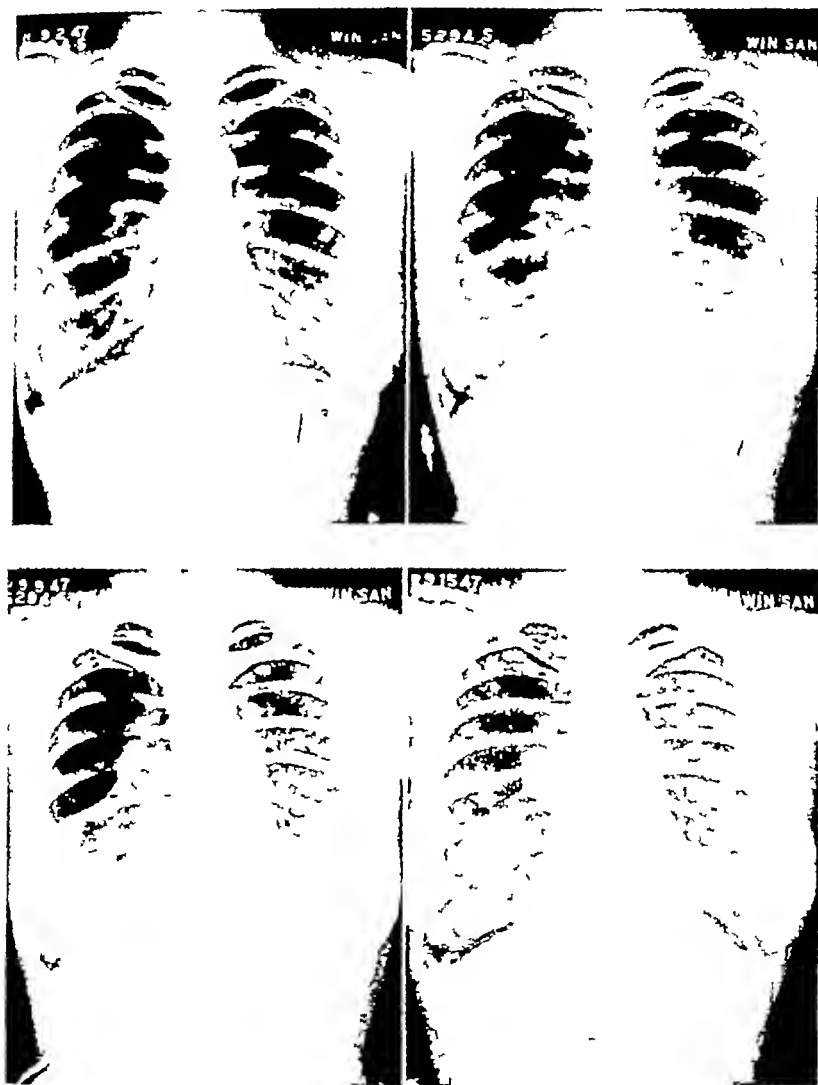


FIGURE 4. X-ray reproductions of films from Case 1, E.S. All of these films are taken in full inspiration—(a) X-ray taken just prior to initiation of therapy—(b) X-ray taken one day after therapy was begun. Note that the rubber tubing, luer-lok, and blunt needle may be seen—(c) X-ray taken one full week after therapy was begun—(d) X-ray taken two full weeks after therapy was begun.

into the right pleural space using the technic outlined above. For the first time since institution of pneumothorax there was an adequate collapse, maintained as in Case 1. There was no tendency to re-expansion although up to the day that the catheter was inserted, her lung re-expanded rapidly between refills. There were no symptoms, discomfort, no evidence of inflammation, or infection of the pleura or the chest wall, and no elevation of temperature.

**Case 3** A.N. A 38 year old white male chosen because of a small lesion in the left midlung field with a small cavity. The rest of the lung was free of tuberculosis and represented the type of a case in which rapid re-expansion is expected following institution of artificial pneumothorax. Initial pneumothorax was done on September 29, 1947. Fluoroscopy on September 30, 1947 showed complete re-expansion of the lung. Refill (500 cc of air) was given, and into the narrow space thus created a catheter was introduced and connected with the constant pressure apparatus. No further refills were given. Fluoroscopy 2 days later (October 2, 1947) showed approximately 50 per cent collapse of the left lung. Analysis of the pleural gas was done at that time. On October 3, 1947 there was some increase in the amount of collapse, and another gas analysis was taken with no introduction of air. These gas analyses, as shown in Table I, indicate a high oxygen concentration and a low con-

TABLE I

*Oxygen-Carbon Dioxide Analyses of Intrapleural Gas (Case 3)*

(Figures expressed in terms of per cent of total volume)

	Oxygen	Carbon Dioxide
Second Day of Collapse	19.1	2.9
Fifth Day of Collapse	19.4	7.1

## Normal Volumes of Intrapleural Gases (Literature)

D. Matzusawa	4.16 - 19.7	5.82 - 6.3
M. Pinner	7.0 - 4.0	7.0
Coryllos, et al	6.0 - 2.1	6.0 - 8.0

Oxygen-Carbon Dioxide values of intrapleural gases as determined from samples taken from Case 3 A.N. Previous determinations done on intrapleural gas of cases treated by the standard technic are included for comparison.

centration of carbon dioxide. At the end of one week the collapse was completely satisfactory in all respects. There were no symptoms up to this time.

*Discussion*

The experience in these three cases indicates the following:

1. The use of a polyethylene catheter in the chest is not conducive to inflammatory reaction or infection, and is well tolerated by the patient.

2. Furthermore, it appears that the collapse of the lung may be

maintained without the necessity of pneumothorax refills as has been indicated by failure of the lungs of these patients to re-expand. That this is not an uncontrolled introduction of air is indicated by Figure 5, showing the constancy of intrapleural pressure when the apparatus is attached. It may be noted by the question marks on the chart that there were days when it was impossible to determine the pressure since no reading was obtained through the catheter.

Originally, we were quite disturbed by this, feeling that no air could be introduced. However, the maintenance of collapse and the further evidence of the gas content seemed to indicate that this inability to obtain pressure readings does not necessarily indicate a completely blocked airway. It appears that a small amount of liquid in the tube may interfere with small fluctuations of the air column. For this reason in the third case a somewhat larger tube was used, and no difficulty in obtaining pressure readings was encountered. It might be noted that there appeared to be no variations in the pressure, and that once the apparatus was set up a particular pressure could be maintained in the chest. Another evidence of ingress of air is found in the gas analysis on the third patient. It has been shown by several authors<sup>1, 2, 6</sup> that the average gas content in a pneumothorax space will range from 6 to 28 per cent oxygen and 6 to 9 per cent carbon dioxide, depending upon

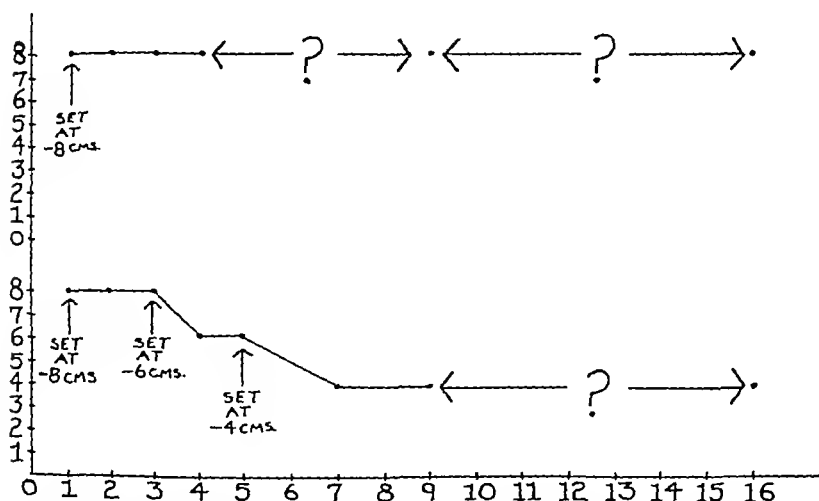


FIGURE 5 Intrapleural chest pressures. The upper graph represents data from Case 1 E.S. The instrument was set to maintain an inspiratory pressure of  $-8$  cm., and it will be noted that whenever pressures were obtained they were always  $-8$  cm. The lower graph represents pressure readings from Case 2 R.Mc. The pressure was set at  $-8$  cm. and stayed at this value for 3 days. When the pressure held by the machine was reduced to  $-6$  cm. on the 3rd day, intrapleural pressures promptly fell. On the 5th day the intrapleural pressure promptly fell to  $-4$  cm. and stayed there when the instrument was set at  $-4$  cm.

the duration of collapse It is felt that any oxygen percentage in a recent pneumothorax over 6 per cent is indicative of ingress of air An oxygen percentage maintained in the vicinity of 19 per cent with a carbon dioxide below 3 per cent must be considered definite evidence that air is being constantly introduced into the chest

It would seem likely that this technic would be extremely valuable in areas where it is difficult for patients to receive frequent refills as well as sections of the world where adequate beds for the number of pneumothorax cases are not present It remains to be seen whether this will prove to be an advantage in every case of pneumothorax One thing appears definite—that air can be introduced into the pleural space as it is needed, and the lung can be maintained in a state of constant collapse rather than a state of constant re-expansion and subsequent collapse On the basis of any theory of efficacy of pneumothorax, a constant collapse is more desirable than an intermittently expanding lung

### DISCUSSION

La experiencia en estos tres casos indica lo siguiente

1) El uso de un catéter de polietileno en el tórax no produce reacción inflamatoria ni infección, y es bien tolerado por el paciente

2) Además, parece que el colapso del pulmón puede ser mantenido sin necesidad de re-insuflaciones del neumotórax a juzgar por el fallo de los pulmones de estos pacientes a re-expanderse Que no se trata de una incontrolada introducción de aire es indicado en la figura 5, que muestra la constancia de la presión intrapleural cuando el aparato está conectado Se puede notar por el signo de interrogación en el cuadro, que hubo días en que fué imposible determinar la presión puesto que no se obtuvo al través del catéter

Al principio, esto nos preocupó grandemente, pensando que no se podría introducir aire Sin embargo, el mantenimiento del colapso y la subsiguiente evidencia del contenido gaseoso parecieron indicar que la imposibilidad de obtener registros de la presión no indicaba necesariamente que hubiese un bloqueo completo Parece que una pequeña cantidad de líquido en el tubo puede interferir con ligeras fluctuaciones de la columna gaseosa Por esta razón, en el tercer caso se usó un tubo algo mayor, y no hubo dificultad en la obtención del registro de las presiones Se puede notar que no pareció haber variaciones en la presión, y que una vez que el aparato fuese instalado una presión determinada podría ser mantenida en el tórax Otra evidencia de entrada de aire se encontró en el análisis del gas del tercer paciente Ha sido demostrado por varios autores<sup>1 2 6</sup> que el gas promedio contenido en un neumotórax

varía entre 6 y 2 por ciento de oxígeno, y entre 6 y 9 por ciento de anhídrido carbónico, dependiendo de la duración del colapso. Se considera que cuando el contenido de oxígeno en un neumotórax reciente es más del 6 por ciento, indica entrada de aire. Un contenido de oxígeno mantenido en los alrededores del 19 por ciento, con anhídrido carbónico inferior a 3 por ciento, debe ser considerado como evidencia definitiva de que el aire está siendo introducido constantemente en el tórax.

Parece posible que esta técnica de extraordinario valor en lugares donde es difícil para los pacientes el obtener frecuentes reinsuflaciones, así como en partes del mundo donde no hay suficientes camas para los casos de neumotórax. Queda por demostrar si será ventajosa también en todos los casos de neumotórax. Una cosa parece definitiva—que el aire puede ser introducido en la cavidad pleural según es necesario, y que el pulmón puede ser mantenido en un estado de colapso constante, en vez de re-expansión constante y subsecuente colapso. Basándose en cualquiera de las teorías sobre la eficacia del neumotórax, un colapso constante es más deseable que uno intermitente.

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# Dihydrostreptomycin in Experimental Tuberculosis\*

## (Preliminary Report)

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Dihydrostreptomycin is the reduced form of streptomycin, wherein the aldehyde group of streptobiosamine is reduced to a primary alcohol group. Dihydrostreptomycin is more stable than streptomycin and, in general, shows the same bacteriostatic action as streptomycin on most organisms.<sup>1</sup> Recently, Youman<sup>2</sup> reported dihydrostreptomycin as having the same tuberculostatic action in-vitro as streptomycin on strain H37Rv. In the following experiments dihydrostreptomycin hydrochloride and streptomycin hydrochloride were tested simultaneously for therapeutic effects in-vivo.

### *Method*

Eight to twelve guinea pigs, averaging 380 gms wt., were used to evaluate each compound. The animals were inoculated in the left groin with 0.01 mg of H37Rv tubercle bacilli. The drugs were given in dosages of 10 mg<sup>1</sup> twice daily subcutaneously to each animal. Smith<sup>3</sup> has shown the effectiveness of streptomycin when given in large dosages twice daily. The experiment was terminated at the end of 6 weeks. Pathological ratings were based on a maximum of 4 for each organ, with a maximum of 16 for all organs. Hemoglobin and weight determinations were made at the end of the experiment.

### *Results and Discussion*

The results are summarized in Table 1. Dihydrostreptomycin is fully as effective as streptomycin under the conditions of this experiment. While the results are not conclusive there is a suggestion that dihydrostreptomycin may be slightly more effective than streptomycin in guinea pig tuberculosis. Bailey and Cavallito<sup>4</sup> have suggested that dihydrostreptomycin possesses no anti-bac-

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\*\*From the Harold Brunn Research Institute, Mt Zion Hospital, San Francisco, California.

<sup>1</sup>This is equivalent to approximately 50 mg/Kg daily.

TABLE 1  
Summary of in-Vivo Experimental Data

	A V E R A G E							PATH RATIO
	P A T H O L O G Y							
	Wt Gain	HGLE	Lymph	Spleen	Liver	Lungs	Total Path	CONTROLS
			Glands					TREATED
Dihydro streptomycin	145	12.6	0.67	0.17	0	0.42	1.25	5.5
Streptomycin	178	12.5	0.75	0.25	0.13	0.63	1.73	3.9
Controls	183	13.1	2.4	2.1	0.5	1.8	6.82	1.0

terial action per se, but is oxidized to streptomycin by the bacteria.

As factors of penetration and concentration maintenance in certain tissues may be more favorable with dihydrostreptomycin than with streptomycin, broader studies are indicated. In addition, other streptomycin derivatives, capable of in-vivo conversion to streptomycin may be of interest. Experiments are now in progress to determine blood concentration versus time curves of dihydrostreptomycin in comparison with streptomycin. There are many factors which determine the ability or inability of a drug to penetrate certain tissues. These factors include permeability behavior dependent upon molecular shape and size, the distribution of polar and ionic groups in the molecule, solubility, distribution coefficient, and the past history of the cells involved.

The brain is a unique organ in its behavior relative to the absorption of various nutrients and other agents across the blood-brain barrier.<sup>7</sup> There is no known rationale, at present, to the remarkable selectivity displayed. Streptomycin is not absorbed in appreciable quantities and has little or no clinical effect on lesions in the brain but suitable derivatives might be absorbed. Such agents, if active chemotherapeutically, might have a definite value in tuberculosis involving the brain, which organ is frequently involved in tuberculous meningitis.

The limitations of the clinical usefulness of streptomycin are due to the drug's apparent inability to penetrate all tissues in sufficient concentration. Corper<sup>5</sup> has shown that the concentration of streptomycin required to retard the growth of tubercle bacilli in-vitro in good nutrient medium can be attained in-vivo for only a brief period. He also questions whether streptomycin enters important organs in appreciable amounts for any significant time. The authors<sup>6</sup> have pointed out that streptomycin seems to be less effective in those types of tuberculosis, wherein caseation predominates. Caseous tissue might constitute a barrier to the



penetration of streptomycin. It is possible that dihydrostreptomycin might penetrate this caseous barrier in greater concentration. Animal and clinical experiments are contemplated to determine these distribution and local therapeutic factors.

### SUMMARY

- 1) Dihydrostreptomycin was found as effective as streptomycin in the therapy of tuberculosis in guinea pigs.
- 2) The possible clinical significance of these results relative to overcoming the limitations of streptomycin is discussed.

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## Kendall Emerson Retires

Aboard the special National Tuberculosis Association train to the annual meeting in Portland, Oregon, in June, 1928, was a handsome, dignified man who was somewhat of a newcomer among the workers in the Association. The famous Managing Director, Dr. Linsly R. Williams, introduced him as Dr. Kendall Emerson. During the next few days the rumor was extant that this gentleman was to succeed Dr. Williams. On October first of that year Dr. Williams resigned and Dr. Emerson was elected to the managing directorship of the National Tuberculosis Association. With this announcement tuberculosis workers everywhere began to inquire about Dr. Emerson's past work. They did not



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question his ability or qualifications for the new position because they had confidence in those who had chosen him. Still they were anxious to know and tell others who he was. They found he was born in Northampton, Massachusetts on June 27, 1875, and received the degree of Bachelor of Arts from Amherst College in 1897 and Doctor of Medicine from Harvard in 1901. After completing an internship in the Massachusetts General Hospital he began to practice orthopedics and general surgery at Worcester, Massachusetts. Later he limited his work to orthopedic surgery which he practiced until 1928. In those days there was still a great deal of tuberculosis of the bones and joints in this country and, therefore, Dr. Emerson's interest in tuberculosis must have been large and continuous since graduation from medical school. Doubtless he had seen many tuberculous cripples who had not been diagnosed in time that treatment could be of any avail. On the other hand, he saw many sufficiently early that he treated them successfully. During these years Dr. Emerson took an active part in the organized effort against tuberculosis in Massachusetts. Obviously he visualized a great opportunity in the whole field of tuberculosis with reference to early diagnosis, proper treatment and prevention and, therefore, the position offered by the National Tuberculosis Association appealed to him.

This Association was organized in 1904. Many persons had contributed mightily to its development, and it was a powerful health organization when Dr. Emerson assumed its management. If anyone had doubt as to the future of the Association under his direction it was promptly dispelled. His poise and equanimity, combined with a vast store of information, kindness to all, but firmness when occasion demanded, immediately gained for him the confidence of tuberculosis workers everywhere. Under his management the Association continued to develop rapidly. All of its worthwhile activities flourished. One project was scarcely finished when another was contemplated and activated. Dr. Emerson

soon was in demand among other nations of the world. He was called to various countries to attend conferences and give advice. He was probably responsible in no small way for 33 nations now having national tuberculosis associations. His ability to select people for key positions with the National Tuberculosis Association is reflected in the fine work accomplished by the various heads of departments and their co-workers. In 1928 the gross income from the Christmas Seal sales was \$5,465,738.71, but in 1946 it was \$17,075,608.44. This phenomenal growth in income has made greater and greater accomplishments possible. In 1928 the mortality rate from tuberculosis in the United States was 79, but in 1946 it was approximately 36 per 100,000. Obviously there has been a corresponding decrease in morbidity and infection attack rate.

Being a member of the Board of Directors of the National Tuberculosis Association when Dr. Emerson became managing director and serving in that capacity for twelve years under his management, and also serving for one year as president of the National Association and on numerous committees during his regime, I had an opportunity to observe him and his work at close range. Never was there a single occurrence to cause my confidence in and admiration for him to waver. It was obvious that he was handling a tremendous task most admirably. On occasions he was criticized for over-conservatism, but I never detected this quality in him to a fault. He was conservative but only to a degree consistent with the responsibilities of his position in guarding the welfare of the Association.

Not one of my numerous requests for information and advice was ever denied. Each one was honored in a most cheerful manner. As editor of a medical journal for the past fifteen years, I have asked Dr. Emerson to prepare an introduction for each special annual number on tuberculosis. His manuscript always arrived well in advance of the deadline, and not once did it fail to contain an important message to our readers. All of this is only voicing the admiration and respect which large numbers of physicians, nurses, public health workers, and laymen hold for Kendall Emerson.

For nearly twenty years he has contributed nobly and magnificently to the cause of tuberculosis control everywhere. Although he expressed a desire to retire some time ago, his loyalty demanded that he remain until a successor was appointed. After the final roundup is over and the history of tuberculosis is written, the name, Kendall Emerson, will loom large, and his contributions will receive their greatly deserved credit for the accomplishment.

J A M

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## James E Perkins Accepts

With the inevitable age retirement of Kendall Emerson a responsibility of great magnitude devolved upon those made responsible for the selection of his successor as managing director of the National Tuberculosis Association. These thoroughly dependable persons combed the country for the qualified person who might be available for this important position. When the committee announced that it had selected Dr James E Perkins and he had accepted the managing directorship of the National Tuberculosis Association effective January 1, 1948, his many friends were delighted and expressed their assurance of the continued success of the National Association. Because he has worked



mostly with public health organizations and departments, he is not known widely among the tuberculosis workers of this country. Many of them are asking who he is. They are certain of his qualifications; otherwise he would not have been selected, but they want to become acquainted with their new leader.

James E Perkins was born in Saint Paul, Minnesota on July 17, 1905. He attended the schools of that city and then entered the University of Minnesota, where he received the degree of Doctor of Medicine in 1930. While in school he developed a keen interest in public health and upon acquiring his medical degree became epidemiologist in the Minnesota State Department of Health. He was offered fellowships to the Johns Hopkins School of Hygiene and Public Health in Baltimore, where he received the degrees of Master of Public Health in 1931 and Doctor of Public Health in 1933. In 1934 he was appointed epidemiologist with the New York State Health Department, and from 1935 to 1938 he served as District State Health Officer. For the next seven years Dr Perkins was Director of the Division of Communicable Diseases. Then he was made Deputy Commissioner of Health of the State of New York in 1946, which position he held at the time of appointment to the National Tuberculosis Association office.

Throughout these years Dr Perkins' interest in tuberculosis has been deep and abiding. It would almost appear that he has devoted his life to preparation for this new position. Indeed, the thesis which he prepared for the Public Health degree at Johns Hopkins School of Hygiene and Public Health under the late Dr Wade Hampton Frost was entitled, "The Study of Tuberculosis Deaths in the Eastern Health District of Baltimore, Maryland, with Special Attention to the Economic Aspects." Another investigation report was entitled "A Study of Tuberculosis Among Mexican Sugar Beet Workers in the Red River Valley of Minnesota." In 1936 he made a special study of tuberculosis deaths in Fulton

and Montgomery Counties in the State of New York, and in 1942 supervised a study conducted by Dr Thomas D Dublin on, "The Epidemiology of Tuberculosis in Columbia County, New York" Thus, he has been striking at the very heart of tuberculosis

In future tuberculosis work there is probably nothing as important as its epidemiology This is one of Dr Perkins' chief interests He is a member of the American Epidemiological Society and a Life Member of the American Public Health Association, in which he has served as Secretary of the Epidemiology Section from 1942 to 1946, and Chairman in 1947 Health education has always been an important activity of the National Tuberculosis Association In this respect Dr Perkins again qualifies admirably He was associate professor of Public Health and Preventive Medicine at the Albany Medical College from 1937 to 1946, and Associate Editor of the American Journal of Public Health from 1942 to 1947

How fortunate the National Tuberculosis Association is in that, at the proper moment, a man with such excellent training, with so much practical experience, with such a keen interest in tuberculosis, with such a delectable personality, with such a splendid record as an educator, and with such a long expectancy of service, should appear on the scene Certainly everyone will rejoice in Dr Perkins' appointment and support him undauntedly

A preponderance of the members of the American College of Chest Physicians in this country are also members of the National Tuberculosis Association The others will profit by becoming members and also contribute to a great cause Moreover, members of the College of numerous other nations should take an active part in their National Tuberculosis Associations Tuberculosis is one of the many chest diseases which the College has pledged itself to destroy

J A M

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# REPORT OF THE COMMITTEE ON THE MANAGEMENT AND TREATMENT OF DISEASES OF THE CHEST\*

For some time this Committee has been occupied with the difficulty of evaluating therapy because of the known inadequacy of the present methods of terminology and because it was impossible to get any large group of men in the field to agree upon what was meant by any of the present diagnostic and therapeutic criteria. During this past year an attempt was made to create some new system of terminology as applied to both diagnostic and therapeutic criteria.

Tuberculosis was used as the disease in question. There was extensive discussion among committee members in the attempt to determine what factors existed in the patient with pulmonary tuberculosis that might in any way influence the necessity for therapy and the efficacy of therapy. We were attempting to find items that could be used in judging diagnostic or therapeutic procedures.

We found that we could not agree even in general on this problem which is admittedly much more simple than the over-all one. In our conversations with other men of great experience in the field, we found further sources of disagreement. As a result of this a list was made of all the various factors which were considered to play a major part in the course or treatment of pulmonary tuberculosis. These amounted to approximately 33 separate factors which were organized and made up into a questionnaire. A sheet of instructions was enclosed with these questionnaires explaining in sufficient detail what was meant by each one of the various terms used. The questionnaire follows.

Patients No	_____	Age	_____	Sex	_____	Color	_____	
		Febrile	_____	Non-febrile	_____			
		(check appropriate space)						
<b>A Diagnosis N T A</b>								
1	Minimal	Moderately Advanced				Far Advanced		
2	Status 1	2	3	4				
<b>B Diagnosis (committee plan)</b>								
1	With Cavity							
a	Solitary cavity			b	Cavity with exudation			
c	Cavity with fibrosis							
2	Without Cavity							
a	Simple exudation			b	Fibrosis		c	Miliary Foci
d	Caseation							
	1 Encapsulated caseous foci							
	2 Caseous pneumonia							
3	Extent and Location (circle to indicate involvement in area)							
	R1	R2	R3					
	L1	L2	L3					
4	Activity							
a	Active		b	Resolving		c	Stable	
<b>C Treatment</b>								
_____								
<b>D Result</b>								
_____								

\*Presented at the Annual Meeting, Board of Regents, American College of Chest Physicians, Atlantic City, New Jersey, June 5, 1947

This was then sent out to sanatoria and tuberculosis services in various sections of this country and to Mexico with the request that each of these institutions fill out the forms for each of the 100 patients who were admitted beginning January 1945. Approximately 1,000 of these forms were returned.

The forms were analyzed to determine 1) whether all of these factors were equally important, 2) whether some factors appeared to play a more important part than others in our problem, and 3) to review once more the correlation between indications, treatment, and clinical results and the customary N.T.A. classification. This made it necessary to check each item against every one of the others. It soon developed into a tremendous mass of statistics. With what was considered proper sampling, we made a complete analysis and found that there was a consistent relationship shown by only a few of the many factors on the form. These were:

- 1) Temperature. Patients with elevated temperature, rectal, 101° F or higher continued for a period of over one month. This group seemed to be associated with a bad prognosis regardless of any other findings. There was also a high correlation between this factor and the difference between bed rest and other therapy.
- 2) Cavity with exudation. In this pathological group there was a very marked difference between results with collapse therapy and results with bed rest.

TABLE I

	Treated	Non-Treated	Good	Unimproved	Dead
Febrile	34%	76%	40%	22 %	38 %
Non-febrile	41%	59%	77%	22 %	2 %
Cavity with Exudation	70%	30%	66%	22.5%	11.5%
Cavity with Fibrosis	25%	75%	75%	12.5%	12.5%
Non-cavitary	0	100%	100%	0	0

It was very interesting to note that some of the characteristics or factors that we were certain would be an important element in the efficacy of treatment, such as color, age, and so forth, do not seem to function *per se* but in relation to the above two factors.

After considerable discussion it seemed that a new terminology that might be of greater value would in addition to everything else have to include under separate categories the above two criteria. It was felt that for the purpose of evaluation of therapy and not, in any sense, an attempt to classify from the standpoint of pathogenesis or course that any pulmonary tuberculosis could be broken down into 3 groups.

These would be 1) non-cavitary, 2) cavity with associated fibrosis, 3) cavity with associated exudation. In each of these groups we would have to separate the febrile and non-febrile patients according to our explanation in group 1.

It is quite obvious that the extent of the disease would also play a very important part in individual cases, that in this preliminary survey

at least, there was not a marked difference until we reached cases with very extensive pathology. It is planned to make up forms embodying these principles and to attempt to thus classify a fairly large group of cases. Since this would be a pilot demonstration, we expect to use for purposes of differentiation only those methods of treatment as are generally accepted and where a favorable end-result is a matter of reasonably general understanding.

This will be compared with bed rest as the base line rather than a complete lack of treatment since we feel that this will give a more accurate measurement. The various sub-committees will do similar studies on the particular subjects under their jurisdiction. This will enable us to secure a mass of very valuable material. Whether it will be possible to evaluate any of the therapeutic measures or whether we simply end up evaluating our methods of criteria remains to be seen.

If our pilot demonstration yields any reasonable degree of accuracy, we will have material upon which we can make a statement of the relationships of indications, efficacy, and end-results of some of the more commonly used methods of treatment. It is hoped further that this year we will complete our first problem and present to the College for its approval a complete system of terminology, diagnosis, and treatment of tuberculosis.

Edwin R. Levine, M.D., Chicago, Illinois, Chairman  
Donato G. Alarcon, M.D., Mexico City, Mexico, Vice-Chairman  
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Jose Ignacio Baldo, M.D., Caracas, Venezuela  
Edward H. Robitzek, M.D., New York, New York

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#### NEW AMERICAN MEDICAL DIRECTORY

Preparations are now being made to publish the new, Eighteenth Edition of the *American Medical Directory*. The last edition of the Directory was issued late in 1942. Since that time, it has been impossible to publish a new edition because of wartime restrictions and the shortage of paper and labor.

About November 15, a directory card will be mailed to every physician in the United States, its dependencies, and Canada, requesting information to be used in compiling the new Directory. Physicians receiving an information card should fill it out and return it promptly whether or not any change has occurred in any of the points on which information is requested. It is urged that those physicians also fill out the right half of the card, which information will be used exclusively for statistical purposes. Even if a physician has sent in similar information recently, mail the card promptly to insure the accurate listing of his name and address. There is no charge for publishing the data nor are physicians obligated in any way.

Should any physician fail to receive one of these Directory Information cards by December 1, he should write at once to the Directory Department of the American Medical Association, requesting a duplicate card be mailed.

**IMPORTANT NOTICE** The cards being mailed by the American Medical Association do not contain a symbol to designate the physicians specializing in Diseases of the Chest. Physicians who wish to be classified in the American Medical Directory as specialists in Diseases of the Chest should write the American Medical Association, 535 North Dearborn St., Chicago, Ill., requesting that the symbol "DC" be used in their listings.



## REPORT OF THE COMMITTEE ON CHEMOTHERAPY AND ANTIBIOTICS

Streptomycin is the most valuable and encouraging agent yet to be developed for the treatment of tuberculosis. After extensive animal experimentation and observation of its clinical use in several thousand patients, certain definite statements may be made. While much clinical investigation remains to be done, streptomycin may now be accepted as a valuable and at times necessary adjunct in the treatment of certain types of tuberculosis.

The optimum daily dose, frequency of administration, and duration of treatment with streptomycin for tuberculosis have not yet been fully established. The accumulated evidence indicates that for an adult 1 gram daily in divided doses given every 6 to 8 hours for 75 to 100 days may be sufficient in many cases. Some recent evidence indicates that a therapeutic dose may be as low as 0.25 gram given as infrequently as once a day. The drug is best given intramuscularly or by deep subcutaneous injection, but not intravenously, in solutions containing 100 to 250 mg of streptomycin per c.c. Excretion is chiefly in the urine.

There is a certain toxicity, and undesirable side reactions may occur. No deaths have been reported resulting from the use of streptomycin. In general, the reactions are mild and even when severe are not sufficient to interfere with treatment of patients with progressive tuberculosis which is not amenable to other therapy. There is some question, because of these side reactions, whether streptomycin should be used in the treatment of patients who would respond satisfactorily to more conventional forms of therapy.

Disturbance of equilibrium due to loss of vestibular function is the most common of these reactions. There is a definite correlation between dosage of streptomycin and this vestibular disorder, which will occur in most of the cases receiving 2 grams or more per day for any long period of time, whereas, administration of 1 gram per day for the same period will cause no such disorder in more than half of the patients so treated.

Evidence of sensitization—chills, fever, nausea, and cutaneous rash—occurs occasionally within the first few weeks of treatment. The administration of the drug should be discontinued in such a case, and after a few days when the symptoms have subsided, the patient should be desensitized with daily doses commencing at 50 to 100 mg and increased gradually to the customary therapeutic dose.

Streptomycin is essential in the treatment of tuberculous meningitis, millary tuberculosis, tuberculosis of the larynx, trachea and bronchi, draining sinuses from tuberculous infection of bones and glands, and tuberculosis of the intestinal tract.

Caution and clinical judgment are required in the treatment of pulmonary tuberculosis with this agent. Not all cases are suitable for this treatment. Old chronic fibrocaseous lesions and thick-walled cavities are not usually affected much, if any, by this drug. Recently developed pneumonic and exudative lesions show the best response, recent and thin-walled cavities may close or show decrease in size.

The greatest use of streptomycin is as an adjunct to the more customary methods of treating pulmonary tuberculosis. The clinician should plan to combine streptomycin with collapse therapy, pulmonary resection, or whatever is indicated to produce a satisfactory result.

The factor which interferes most seriously with prolonged treatment with streptomycin is the development of streptomycin resistant strains of tubercle bacilli. This apparently occurs most frequently during the third or fourth month of treatment, and may limit the effectiveness of the treatment to that period. In many of these cases, subsequent treatment with streptomycin will be found to be ineffective. Some work is being done on combination of streptomycin with other substances which may aid in postponing the development of resistant strains.

It should be remembered that streptomycin cannot improve irreversible destructive tissue changes and, in general, cannot replace surgical treatment. It can and does widen the indications for surgical treatment by reducing toxicity, diminishing the tendency of the disease to spread, and causing resolution of many recent exudations. It can thus improve the patient's status to the point where surgical treatment may be done with greater safety and better end results.

Streptomycin is not a cure-all nor even a real cure. It will not replace sanatorium or hospital care nor substitute for accepted treatment in most cases. However, the time has come to state that its value has been established and that it has a definitely recognized place in the treatment of tuberculosis. It should be available to all patients in whom its use is a necessary or important adjunct to their recovery. For this reason an item covering the cost of this drug should be included in the annual budgets of all institutions established for, or undertaking the treatment of, tuberculosis.

Karl H Pfuete, M.D., F.C.C.P.,  
Chairman, Subcommittee on Chemotherapy  
and Antibiotics

Edwin R. Levine, M.D., F.C.C.P.,  
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Treatment of Diseases of the Chest

*Committee on Chemotherapy and Antibiotics*

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## REPORT OF COMMITTEE ON CHEST DISEASES IN PENAL AND MENTAL INSTITUTIONS\*

Sufficient sporadic reports have stressed the important incidence and lack of uniform control programs of chest diseases in mental and penal institutions. Recent survey studies are emphasizing the high morbidity of tuberculosis. There appears, with exceptions, to be no persistent effort to repeat these analyses or afford modern therapy.

In some states a disproportionally high percentage of tuberculosis mortality is accounted for because of uncontrolled disease within governmental institutions.

Mental patients and penal inmates are forgotten and unwanted groups, but important foci of infection. These, the fellow employees and the communities to which discharges and parolees return have a right to expect more from the taxing and responsible agencies. Phthisis is still in the consumptive era in too many of the governmental confines.

Since these institutions are notoriously understaffed, the solution ultimately results in overcoming the problem of personnel. For example, one of the states has had a control program in effect over six years and at present has approximately 2000 mental patients with active tuberculosis. Lack of trained personnel has permitted only the simplest therapy.

An Advisory Committee of recognized chest specialists in one state has overcome administrative inertia and permitted an even flow of policy in spite of personnel changes.

### *Recommendations*

(1) The non-political appointment of advisory committees in each state deserves careful consideration.

(2) That the local chapters of the American College of Chest Physicians take an active interest in the problem of chest diseases in these special groups in their area.

(3) State Medical Societies should be informed of the "crying need" for adequate measures to combat this source of constant danger of infection for the population at large.

(4) The national organizations dealing with health problems should assume their part in the responsibility and guidance in carrying this problem to a successful termination. The combined efforts of all groups will be needed.

(5) In the present program of hospital expansion the need of separate units to care for these special groups must be emphasized. In planning these units architects should consult not only with psychiatrist and penologist but also with chest specialists.

(6) At least temporarily, the services of local specialists in diseases of the chest should be utilized wherever possible in lieu of permanent trained personnel.

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\*Presented at the Annual Meeting, Board of Regents, American College of Chest Physicians, Atlantic City, New Jersey, June 5, 1947.

## POSTGRADUATE COURSE IN DISEASES OF THE CHEST

Sixty-two physicians from 20 states, the District of Columbia, Canada, China, Cuba, Mexico and Spain, registered for the Postgraduate Course in Diseases of the Chest sponsored by the Council on Postgraduate Medical Education of the American College of Chest Physicians in Chicago September 15th-20th, 1947. Letters received from the physicians who enrolled for the course indicated that this was by far the most outstanding course in diseases of the chest in which they have participated.

The faculty, under the chairmanship of Dr Edwin R Levine, Chief of the Chest Service at Michael Reese Hospital, Chicago, was recruited from New York City, Washington, D C, Detroit, Denver, Minneapolis, Cannon Falls, Minnesota, Milwaukee, and Chicago. Each lecturer was selected because of his outstanding work in a particular phase of the specialty.

To close the week's program, a dinner was given by the Council on Postgraduate Medical Education of the College for the instructors and for the physicians who registered for the course. Dr J Winthrop Peabody, Washington, D C, Chairman of the Council on Postgraduate Medical Education, presided. The following instructors attended the dinner: Dr Andrew L Banyai, Milwaukee, Wisconsin, and Dr Paul H Hollinger, Dr Minas Joannides, Dr Edwin R Levine, Dr Arthur W Newitt, and Dr Leon Unger, Chicago, Illinois. Dr Walter E Vest of Huntington, West Virginia, was present and introduced.

Dr George F Grisinger, Charleston, West Virginia, class valedictorian, made the following remarks:

"It is a pleasure and privilege for me, as Valedictorian for the 1947 Class of Physicians who participated in the Second Annual Postgraduate Course on Diseases of the Chest, in Chicago, to say a few words on behalf of my colleagues and myself to our instructors and to all others who have made this course so instructive and enjoyable to us.

"We are deeply grateful to the physicians who have given so unselfishly of their time and energies to extend this very interesting course to us. We are happy to have had an opportunity to listen to these eminent teachers who have participated in this most enlightening course on diseases of the chest.

"We particularly wish to thank Dr Edwin R Levine, Chairman of this splendid postgraduate course, for his untiring efforts in organizing and directing the course. We also wish to thank Mr Murray Kornfeld, Executive Secretary of the College, and his staff, for the excellent arrangements in connection with the course. We wish, also, to express our appreciation to the management of the Municipal Tuberculosis Sanitarium, for their fine hospitality.

"To each of the Instructors we desire to leave a sincere note of appreciation for the knowledge which has so generously been given to us in the Lecture Hall.

"The Members of the Class, who have come from 20 States, the District of Columbia, Canada, China, Cuba, Mexico, and Spain are deeply honored to be members of the Postgraduate Course of 1947.

"It is our sincere hope that the course will be repeated annually, and that those who follow us will profit as much from the succeeding courses as we have profited from this one.

"I again wish to thank you for your cordial hospitality and we shall remember the many happy days spent in Chicago."

SECOND ANNUAL POSTGRADUATE COURSE IN DISEASES OF THE CHEST, AMERICAN COLLEGE OF CHEST PHYSICIANS  
September 15-20, 1947, Municipal Tuberculosis Sanitarium, Chicago, Illinois



Some of the physicians and instructors who participated in the Second Annual Postgraduate Course in Diseases of the Chest of the American College of Chest Physicians

Following is a list of the physicians who registered for the course

F Kenneth Albrecht, M.D, Baltimore, Maryland  
 Pedro Alegria Garza, M.D, Mexico City, Mexico  
 W H Angerman, M.D, Massillon, Ohio  
 J A Baird, M.D, Fargo, North Dakota  
 Frank Barrera, M.D, Havana, Cuba  
 Lt (jg) Robert L Bauer, USN Jacksonville, Florida  
 Capt Frank A Benchik, USA, Denver, Colorado  
 Lt (jg) Charles A Beskin, USN, Brooklyn, New York  
 John H Bisbing, M.D, F C C.P, Reading, Pennsylvania  
 W M Blair, M.D, West Palm Beach, Florida  
 Mary C Block, M.D, Santa Ana, California  
 William Block, M.D, Hartselle, Alabama  
 A J Bondurant, M.D, F C C.P, Springfield, Missouri  
 Lt (jg) Carl D Brannan, USN, Jacksonville, Florida  
 Walter B Brown, M.D, San Fernando, California  
 Jaime Capo, M.D, F C C.P, Valencia, Spain  
 Capt William Cernock, USA, El Paso, Texas  
 James W Dimon, M.D, F C C.P, Utica, New York  
 Howard K Edwards, M.D, F C C.P, Miami, Florida  
 Col Paul Fancher, USA, Battle Creek, Michigan  
 Col James O Gillespie, USA, San Antonio, Texas  
 Andrew C Goessl, M.D, Chicago, Illinois  
 Roy Goggans, M.D, Hillsboro, Texas  
 Col Mack M Green, USA (F C C.P), San Francisco, California  
 George F Grisinger, M.D, Charleston, West Virginia  
 William Grosfeld, M.D, F C C.P, Decatur, Alabama  
 Victor J Hagen, M.D, Manitoba, Canada  
 Jesse W Hofer, M.D, Chicago, Illinois  
 J S Hoffman, M.D, F C C.P, Kansas City, Missouri  
 Lt (jg) Ralph A Jessar, USN, Jacksonville, Florida  
 Lt (jg) Seymour R Kaplan, USN, Jacksonville, Florida  
 William W Kearney, M.D, Oakdale, Iowa  
 Oliver Marcotte, M.D, F C C.P, Detroit, Michigan  
 Helen Marshall, M.D, Statesan Wisconsin  
 Col John McBride, USA, Scott Field, Illinois  
 Marshall L McClung, M.D, Indianapolis, Indiana  
 Andrew Nady, M.D, F C C.P, Tucson, Arizona  
 A H Nejat, M.D, Woodhaven, Long Island, New York  
 Daniel N Pickar, M.D, Louisville, Kentucky  
 Frank M Quinn, M.D, Chicago, Illinois  
 Capt Edgar Riden, USN (F C C.P), Corona California  
 Joseph Rosenwasser, M.D, Mishawaka, Indiana  
 J Rubin, M.D, F C C.P, Outremont, Canada  
 Paul T Russell, M.D, Albany, Georgia  
 F Fred Ruzicka, M.D, Baltimore, Maryland  
 Maurice Saibil, M.D, Montreal, Canada  
 Martin P Sasko, M.D, Chicago, Illinois  
 Lt (jg) Roy F Saxon, USN, Great Lakes, Illinois  
 Maurice W Shertoli, M.D, Chicago, Illinois  
 William H Shlaes, M.D, Chicago, Illinois  
 Richard C Schneble, M.D, F C C.P, Dayton, Ohio  
 C A Slaughter, M.D, F C C.P, Houston, Texas  
 J F Spigler, M.D, F C C.P, Terre Haute, Indiana  
 A J Steiner, M.D, F C C.P, St Louis, Missouri  
 Lloyd K Swasey, M.D, F C C.P, Phoenix, Arizona  
 Y K Tseung, M.D, Honk Kong, China  
 Lt Col Joseph Vivas, USA, Washington, D C  
 Ruth Wells, M.D, F C C.P, Pasadena, California  
 Robert Wiener, M.D, Chicago, Illinois  
 Agatha Wilhelm, M.D, South Bend, Indiana  
 Charles Lee Williams, M.D, Chicago, Illinois  
 Comdr Marion T Yates, USN, Great Lakes, Illinois

## College Chapter News

### CALIFORNIA CHAPTER

Dr Joseph L Robinson, Los Angeles, President of the California Chapter of the College, has made the following committee appointments for the year 1947-1948

#### *Membership Committee*

John C Sharp, M.D, Salinas, Chairman  
William A Cassidy, M D, Livermore  
James T Harkness, M.D, Berkeley  
Paul N Smith, M.D, Olive View

#### *Program Committee*

Jane Skillen, M.D, Olive View, Chairman  
Cabot Brown, M.D, San Francisco  
Gordon A Diddy, M D, Ahwahnee  
William A Kinney, M.D, Riverside  
David T Proctor, M.D, Pasadena

#### *Nominating Committee*

Edward W Hayes, M.D, Monrovia, Chairman  
Forrest J. Bell, M.D, San Francisco  
Jacob J Singer, M.D, Beverly Hills

#### *Postgraduate and Undergraduate Education Committee*

William L Rogers, M.D, San Francisco, Chairman  
Frank S Dolley, M.D, Los Angeles  
Seymour M Farber, M.D, San Francisco  
Edward W Hayes, M D, Monrovia

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### ILLINOIS CHAPTER

The Illinois Chapter of the College sponsored a scientific meeting at the Congress Hotel, Chicago, on Friday evening, November 7th. A dinner was held at the Congress Hotel at 6 30 and the following scientific program was presented at 8 00 p m

#### *The Place of Excision of the Lung in the Treatment of Pulmonary Tuberculosis*

##### *"Indications for Excision"*

Edwin R Levine, M D, F C C P, Chicago, Illinois

##### *"The Tuberculous Lesion of the Bronchus as it Affects Excision"*

Paul H Hollinger, M.D, F C C.P, Chicago, Illinois

##### *"Problems of the Surgical Procedure"*

Jerome R Head, M.D, F C C.P, Chicago, Illinois

##### *"Care of the Patient Pre-operatively and Post-operatively"*

George W Holmes, M.D, Chicago, Illinois

Discussion was opened by Minas Joannides, M.D, F C C P, Chicago, Illinois, and many of those present participated

### INDIANA CHAPTER

The Indiana Chapter of the College met with the Anti-Tuberculosis Committee of the Indiana State Medical Association on October 28, during the 98th Annual Session of the Indiana State Medical Association held at the French Lick Springs Hotel, French Lick, Indiana. A luncheon meeting of the state and local county Anti-Tuberculosis Committees of the Indiana State Medical Society was held.

Following general discussion, an x-ray conference, sponsored by the Indiana Chapter of the College, was held, at which many interesting films were shown.

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### NEW ENGLAND STATES CHAPTER

The New England States Chapter of the College met at Boston, Massachusetts, on September 17. A scientific program was presented, which was very well attended, not only by many members of the College, but also by physicians from Spain, Belgium, Norway and Cuba.

The following officers were elected for the year 1947-1948:

U E Zambarano, M.D., Wallum Lake, Rhode Island, President

Moses J. Stone, M.D., Boston, Massachusetts, Vice-President

John B. Andosca, M.D., Mattapan, Mass., Secy.-Treas. (Re-elected)

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### NEW JERSEY CHAPTER

The New Jersey Chapter of the College held its Fall Clinical Program on October 21st at the Valley View Sanatorium, Paterson, New Jersey. Dr. Benjamin P. Potter, Jersey City, spoke on "Observation in Diagnosis and Treatment of Chest Diseases Commonly Encountered in the Practice of Medicine and Surgery." Interesting case reports were also presented by other chapter members. This meeting was a joint meeting of the Passaic County Medical Society and the New Jersey Chapter of the College.

The Board of Trustees of the State Medical Society of New Jersey during the year authorized the inclusion of a Session on Chest Diseases for its 1948 Annual Meeting to be held in Atlantic City, April 26-29. The meeting will take place at the Hotel Haddon-Hall. Dr. John E. Runnels, Scotch Plains, was appointed Chairman of the Session, and Dr. Homer H. Cherry, Paterson, was appointed Secretary.

The chapter reported that an active Membership Committee, under the Chairmanship of Dr. Joseph A. Smith Glen Gardner, has resulted in an increase in the chapter membership.

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### PENNSYLVANIA CHAPTER

At the business meeting of the Pennsylvania Chapter of the College which was held in Pittsburgh on September 18, the following officers were elected for the year 1947-1948:

Burgess Gordon, M.D., Philadelphia, President

Elmer Highberger, M.D., Greensburg, Vice-President

Edward Lebovitz, M.D., Pittsburgh, Secy.-Treas. (Re-elected)



## PUERTO RICO CHAPTER

The Puerto Rico Chapter of the College met in Guayama on September 28th, at the office of Dr Jaime Fuster who played host to the group. Dr David E García, Hato Rey, Regent of the College for Puerto Rico, presented a very interesting paper on "Pulmonary Lesions in Schistosomiasis" which stimulated much discussion between the clinicians and the radiologists. Dr Luis A Passalacqua of Santurce, talked of his personal experiences with six cases of "Vagotomy with Transpleural Approach for Peptic Ulcer" and Dr Manuel Guzman-Rodriguez, Santurce, discussed the x-ray aspects of the problem.

A Board of Examiners was elected by the chapter at their meeting which will start functioning in January, 1948. The Board members elected are as follows:

Manuel Guzman-Rodriguez, M.D., F C C.P., Santurce  
Jose Soto Ramos, M.D., F C C.P., Rio Piedras  
Felix M. Reyes, M.D., F C C.P., Bayamon  
Juan H. Font, M.D., F C C.P., San Juan  
Jaime F. Pou, M.D., F C C.P., Hato Rey

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## ROCKY MOUNTAIN CHAPTER

At the annual meeting of the Rocky Mountain Chapter of the College, held September 16, at the Shirley Savoy Hotel, Denver, Colorado, the following officers were elected for the year 1947-1948:

Lorenz W. Frank, M.D., Denver, Colorado, President  
J. E. J. Harris, M.D., Albuquerque, New Mexico, First Vice-President  
R. G. Rigby, M.D., Salt Lake City, Utah, Second Vice-President  
W. B. Yegge, M.D., Denver, Colorado, Secy.-Treas. (Re-elected)

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## TEXAS CHAPTER

Dr Charles J. Koerth, Kerrville, Secretary-Treasurer of the Texas Chapter of the College, announces that Dr H. Frank Carman, Dallas, President of the Chapter, has appointed the following committees for the year 1947-1948:

*Medical Education Committee*

John Chapman, M.D., Dallas, Chairman  
Howard T. Barkley, M.D., Houston  
George S. McReynolds Jr., M.D., Galveston

*Program Committee*

Charles J. Koerth, M.D., Kerrville, Chairman  
Michael A. Cunningham, M.D., Beaumont  
Cuthbert B. Young, M.D., Tyler

*Public Relations Committee*

Walter C. Brown, M.D., Corpus Christi, Chairman  
Ernest E. Holt, M.D., College Station  
Ralph H. Homan, M.D., El Paso

*Membership Committee*

William W Coulter Jr , M.D , McAllen, Chairman  
Wayne A Reser, M.D , Wichita Falls  
Hubert T Ivey, M D , Legion

*Nominating Committee*

Charles M Hendricks, M.D , El Paso, Chairman  
Sim Hulsey, M.D , Ft Worth  
Howard E Smith, M.D , Austin

*Arrangements Committee (Houston Meeting)*

J Emerson Dalley, M.D , Houston, Chairman  
Clarence R Bruhl, M.D , Houston  
Walter J Stork, M.D , Houston

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WISCONSIN CHAPTER

The Wisconsin Chapter of the College had a very successful meeting in Milwaukee on October 5, with more than 100 members and guests attending. New officers were elected for the Chapter for the ensuing year. They are as follows:

Ethan B Pfefferkorn, M.D , Oshkosh, President  
George H Jurgens, M.D , Milwaukee, Vice-President  
Leon H Hirsh, M.D , Milwaukee, Secretary-Treasurer (Re-elected)

Dr Ethan B Pfefferkorn, President of the Chapter, has announced the following committee appointments for the year 1947-1948:

*Program Committee*

Andrew L Banyal, M.D , Milwaukee, Chairman  
Earl E Carpenter, M.D , Superior  
David D Feld, M.D , Milwaukee

*General Arrangements Committee*

Douglas A. Guthell, M.D , Milwaukee, Chairman  
John C Dundee, M.D , Waukesha  
Oscar C Heyer, M.D , Janesville  
Karl E Kimber, M.D , Waukesha  
Louise G Nezowski, M.D , Hawthorne  
Valentine O'Malley, M.D , Milwaukee

*Educational Committee*

Herbert H Christensen, M D , Wausau, Chairman  
William T Clark, M.D , Janesville  
Karl E Kassowitz, M.D , Milwaukee  
Thomas O Nuzum, M.D , Janesville  
Paul E Pfifer, M.D , Kenosha  
Leonard L Sanford, M.D , Hillsboro  
John K Shumate, M.D , Madison

*Publicity and Reception Committee*

Mischa Lustok, M.D , Milwaukee, Chairman  
Harry Barrell, M D , Waukesha  
John P Fetherston, M.D , Milwaukee  
William B Ford, M.D , Milwaukee  
Emil Rothstein, M.D , Wood

*Membership Committee*

Leon H Hirsh, M.D , Milwaukee, Chairman  
 Laurie L Alien, M.D , Milwaukee  
 Raymond H Evers, M.D , Madison  
 Isabelle T Gadzikowski, M.D , Milwaukee  
 Thomas C Nuzum, M.D , Janesville  
 Marres H Wirig, M.D , Madison

*Scientific Arrangements Committee*

George H Jurgens, M.D , Milwaukee, Chairman  
 Philip P Feingold, M.D , Milwaukee  
 Esther W Goldberger, M D , Milwaukee  
 Stanley R Szymanski, M.D , Wood

*X-Ray Conference Committee*

Richard P Jahn, M.D , Milwaukee, Chairman  
 Henry A Anderson, M.D , Stevens Point  
 William T Clark, M.D , Janesville  
 John W Connell, M.D , Fond du Lac  
 Leonard W Moody, M.D , Bayfield

*Nominating Committee*

Carl O Schaefer, M D , Racine, Chairman  
 Andrew L Banyai, M D , Milwaukee  
 Alfred A Busse, M.D , Jefferson

## CENTRAL AMERICAN CHAPTER TO BE ORGANIZED

The Second Central American Congress on Tuberculosis will be held in San Salvador, C A , November 13-15, 1947 The following subjects are to be discussed

"Resultados tardios de los distintos tratamiento de la tuberculosis pulmonar"

"Tratamiento de las tuberculosis precoz"

"Tuberculosis y embarazo"

The following members of the American College of Chest Physicians will participate in the discussions

Amadeo V Mastellari, M.D , F C C P , Panama City, Republic of Panama,  
 Regent of the College for Central America

Augustin A Sosa, M.D , F C C P , Panama City, Republic of Panama,  
 Governor of the College for the Republic of Panama

Enrico Coronado Iturbide, M.D , F C C P , Guatemala City, Guatemala,  
 Governor of the College for Guatemala

Raul Blanco Cervantes, M.D , F C C P , Provincia Cartago, Costa Rica,  
 Governor of the College for Costa Rica

Rene Vargas L , M.D , F C C P , Managua, Nicaragua,  
 Governor of the College for Nicaragua

Carlos Gonzalez B , M D , F C C P , San Salvador, El Salvador, Governor  
 of the College for El Salvador

Arturo Blanco Solis, M.D , F C C P , San Jose, Costa Rico

Maximo V Carrizo, M.D , F C C P , Colon, Republic of Panama

Plans are being formulated to organize the Central American Chapter of the College at this Congress

## College News Notes

Evarts A. Graham, M.D., F.C.C.P., St. Louis, Missouri, was presented with the Lister Medal by the Royal College of Surgeons in London on September 22nd

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Karl H. Pfuetze, M.D., F.C.C.P., Cannon Falls, Minnesota, has received a grant of \$4,182 for research in streptomycin in tuberculosis, under the Grants-in-Aid Program of the National Institute of Health Research. G. R. Meneely, M.D., F.C.C.P., Nashville, Tennessee, received a grant from the same source in the amount of \$40,581 for experimental study of myocardial infarction

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M. D. Bonner, M.D., F.C.C.P., Jamestown, North Carolina, presented a paper on "Bronchiectasis Clinic" at the Tri-State Medical Association of the Carolinas and Virginia's Forty-Eighth Annual Meeting, Greensboro, North Carolina, March 3rd and 4th

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Edgar W. Davis, M.D., F.C.C.P., Washington, D. C., and David Salkin, M.D., F.C.C.P., Hopemont, West Virginia, have had their paper entitled "Intrathoracic Gastric Cysts" published in the September 27th issue of the Journal of the American Medical Association

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Osler A. Abbott, M.D., F.C.C.P., Atlanta, Georgia, presented two papers at the meeting of the Medical Association of Georgia at Augusta, April 23rd. The titles of the papers were "Experiences with a New Method for the Control of Intrathoracic Aneurysms" and "The Clinical Significance of Hemoptysis: A Study of 1316 Patients with Chest Disease"

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Ovidio Garcia Rosell, M.D., F.C.C.P., Lima, Peru, Governor of the College for Peru, presided at a special meeting of the Federacion Medica Peruana honoring Dr. Morris Fishbein, Editor of the Journal of the American Medical Association. The meeting was held in Lima on August 6th

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The following College members lectured in the Fall Graduate Instructional Course in Allergy given by the American College of Allergists under the auspices of the University of Cincinnati College of Medicine, at Cincinnati, Ohio, on November 3rd to 8th: Fred W. Wittich, M.D., Minneapolis, Minnesota; Bret Ratner, M.D., New York, N. Y.; J. Warrick Thomas, M.D., Richmond, Virginia; Ethan Allan Brown, M.D., Boston, Massachusetts; and Orval R. Withers, M.D., Kansas City, Kansas

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The following Fellows of the American College of Chest Physicians presented papers at the 12th Assembly of the United States Chapter of the International College of Surgeons which was held in Chicago, September 28th through October 4th: William F. Rienhoff Jr., M.D., Paul H. Hollinger, M.D., Albert H. Andrews Jr., M.D., and Chevalier L. Jackson, M.D. The following Fellows of the College had movies presented on the motion picture program for the meeting: Richard H. Overholt, M.D., Edgar Davis, M.D., and John Roberts Phillips, M.D.

Herman E Hilleboe, M.D, F C C.P, Albany, New York, New York State Commissioner of Health, spoke at the Tuberculosis Institute in Rochester, New York on September 18th, at a meeting sponsored by various local agencies Dr Hilleboe reviewed the newer advances in the treatment of tuberculosis and their relation to the over-all control program

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Maurice G Buckles, M.D, F C C.P, formerly of Louisville, Kentucky, has accepted a position on the faculty of the Ohio State University Medical School, department of chest surgery, and has opened private offices in Columbus, Ohio

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Brian A Barlow, M.D, F C C.P, Dermott, Arkansas, was elected President of the Arkansas Tuberculosis Association during the annual meeting of the Association in Little Rock on September 10th

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Karl H Pfuetze, M.D, F C C.P, Cannon Falls, Minnesota, visited Missouri on the 23rd and 24th of October He talked at the Post-Graduate Assembly at the University of Kansas on Thursday, October 23rd, and later in the afternoon took a plane to south Missouri where he addressed the meeting of the Eighth District Council Meeting of the Missouri State Medical Association Dr Pfuetze's subject was "The Use of Streptomycin in Tuberculosis" On Friday the 24th, he talked to the staff members of the U S Veterans Administration Hospital at O'Reilly Hospital, Springfield, Missouri

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Joseph C Placak, M.D, F C C.P, Cleveland, Ohio, Chairman of the Board of Regents of the College, was given the Distinguished Service Award by the Community Chest Organization of Cleveland for tireless and effective service in the prevention and cure of tuberculosis In presenting the Award to Dr Placak, Mr Hal H Griswold, Campaign Chairman of the Community Chest, stated that Dr Placak had given unselfishly of his services to the community for a period of more than 40 years, and that in recognition of these fine services, he was elected as the recipient of this Award  
*Cleveland Plain Dealer, October 22, 1947*

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Otto L Bettag, M D, F C C.P, Pontiac, Illinois, Chairman of the Committee on Chest Diseases in Penal and Mental Institutions of the College, has announced that a meeting of the committee took place in Columbus, Ohio, November 14, 15 and 16

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#### FIRST ARGENTINE CONGRESS ON BRONCHESOPHAGOLOGY

The First Argentine Congress on Bronchoesophagology will take place in Cordoba (Alta Gracia), Argentina on December 12 and 13, 1947 This Congress has been organized by the Argentine Society of Bronchoesophagology and the Society of Otorhinolaryngology of Cordoba Drs Chevalier Jackson and Chevalier L Jackson of Philadelphia, Pennsylvania, are Honorary Presidents of the Congress, and Dr Alvaro Bence, Buenos Aires, Argentina, is President of the Executive Committee

The programs for the two days of the Congress are as follows

*December 12th*

"Indicaciones Diagnosticas y Terapéuticas en Broncología"

Alvaro Bence, M.D

Discussant Juan Manuel Tato, M.D

"Indicaciones Diagnósticas y Terapéuticas en Esofagología"

Jose Ameriso, M.D

Discussant Antonio Carrascosa, M.D

*December 13th*

"Enseñanza Universitaria de la Broncoesofagología"

Roger Lanza Castelli, M.D

Discussant Tomas de Villafane-Lastra, M.D , F C C P

"Servicios Hospitalarios de Endoscopia Peroral"

Oscar A. Vaccarezza, M.D , F C C P

Discussant Lazaro Langer, M D

"Endoscopia Peroral en el Niño"

Abelardo Irigoyen Freire, M.D

Discussant Emilio E Tolosa, M.D

Dr Chevallier L Jackson, Chairman of the Council on Pan American Affairs of the College, will be guest of honor at the Congress in Cordoba and while in Argentina he will give two courses in bronchoesophagology One course will be given in Buenos Aires, December 1-7, for the physicians in that city and in the Province of Buenos Aires, and the other will be given in Cordoba, December 8-14, for the physicians in Cordoba and the interior of the Republic

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#### 1947 EDITION OF PARERAGON

Pareragon (work by the side of work) is Mead Johnson & Company's picture book of artistic works by physicians The current edition is a book of 208 pages and shows 1100 examples of creative art by contemporary physicians This book is available without charge only to physicians upon request of Mead Johnson & Company, Evansville 21, Indiana, U S A

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#### TUBERCULOSIS CASE FINDING PROGRAM LAUNCHED BY THE NEW YORK STATE DEPARTMENT OF HEALTH

The New York State Department of Health has launched another phase of its intensified tuberculosis case finding program, according to announcement by Dr Herman E Hilleboe, Commissioner

This new phase is one of promoting routine chest x-ray examinations of patients admitted to general hospitals having 7000 or more admissions per year through the loan of complete equipment for making small x-ray films The objective of the program is to make an x-ray examination of each patient, 15 years of age and over, admitted to such a general hospital so that previously unknown cases of tuberculosis may be found The chest x-ray examination of all hospital employees not previously examined and of all new employees is an important part of the program

## PACIFIC NORTHWEST DISTRICT CHAPTER

A meeting of the Pacific Northwest District Chapter of the College and the local chapter of the American Trudeau Society took place in Seattle, Washington, at the Medical and Dental Building Auditorium on October 30 and 31. The following program was presented

*Morning Session, October 30, 1947**Symposium on the Use of Streptomycin in Tuberculosis*

John Carswell, M.D., F.C.C.P., Vancouver, Washington

William G. Lewis, M.D., F.C.C.P., Walla Walla, Washington

"The Use of Streptomycin in British Columbia,"

William Hatfield, M.D., F.C.C.P., Vancouver, B.C.

"Miliary and Meningeal Tuberculosis Treated by Streptomycin Case Report," John E. Tuhy, M.D., Portland, Oregon

Discussion: Ellison F. White, M.D., Seattle, Washington,  
Grover C. Bellinger, M.D., F.C.C.P., Salem, Oregon,  
Frank I. Terrill, M.D., F.C.C.P., Deer Lodge, Montana

*Afternoon Session, October 30, 1947**Symposium on Pulmonary Resection in Tuberculosis*

Fred J. Jarvis, M.D., Seattle, Washington

John E. Tuhy, M.D., Portland, Oregon

Discussion: Frank I. Terrill, M.D., F.C.C.P., Deer Lodge, Montana,  
Elliott Harrison, M.D., F.C.C.P., Vancouver, B.C.

"Auxiliary Techniques in the X-ray Diagnosis of Certain Pulmonary Lesions," Donal R. Sparkman, M.D., Seattle, Washington

*Dinner, New Washington Hotel, October 30, 1947*

Presentation of the President of the Pacific Northwest District Chapter, American College of Chest Physicians

X-Ray Conference

*Morning Session, October 31, 1947**Symposium on Anoxemia*

Frederick R. Becker, Ph.D., Department of Anatomy, University of Washington Medical School

Daniel M. Green, M.D., Department of Medicine, University of Washington Medical School

Loren G. Carlson, Ph.D., Department of Physiology, University of Washington Medical School

Discussion: James Blackman, M.D., Seattle, Washington,  
"Mechanics of Respiration"

*Luncheon*

Organizational Meeting of Local Chapter of the American Trudeau Society

*Afternoon Session, October 31, 1947*

"Cardiac Surgery,"

William S. Conklin, M.D., F.C.C.P., Portland, Oregon

"Treatment of Thoracic Aortic Aneurysms by Cellophane Wrapping,"

J. Karl Poppe, M.D., F.C.C.P., Portland, Oregon

## 1948 COLLEGE DIRECTORY

The 1948 College Directory has been placed in the mails. If you have not received your copy please notify the Executive Offices of the College in Chicago.

This is the seventh issue of the Directory of the American College of Chest Physicians. The Directory, consisting of 364 pages, contains the names of 2274 Fellows, Associate Fellows, and Associate Members of the College whose applications were approved prior to May 15, 1947. Supplementary listings of new members will be printed and distributed to the membership of the College from time to time. The present membership of the College is 2405.

Members in the Directory are listed from 47 states, the District of Columbia, Alaska, Hawaii, Puerto Rico, Argentina, Australia, Belgium, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, England, Greece, Guatemala, Haiti, India, Italy, Jamaica, Yugoslavia, Lebanon, Mexico, New Zealand, Nicaragua, Norway, Paraguay, Peru, Philippine Islands, Portugal, Republic of Panama, South Africa, Sweden, Switzerland, Uruguay and Venezuela. The 1943 Directory of the College contained the names of 1255 members. The 1948 Directory shows a substantial increase both in members and in the number of countries in which there are members of the College.

The Directory contains the By-Laws and Articles of Incorporation which were enacted at the Eighth Annual Meeting of the College held in Atlantic City, New Jersey, June 6-8, 1942. It lists the names of the past presidents, and of chapters with dates of organization.

The Board of Regents of the American College of Chest Physicians, under whose supervision this Directory has been compiled, trusts that the Directory will be of service to the members of the College.

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Additional copies of the Directory are available at \$5.00 per copy.

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SCHOLAR IN MEDICAL SCIENCE PROGRAM ANNOUNCED  
BY MARKLE FOUNDATION

*\$250,000 Annually Available for Five-year Post-fellowship  
Grants beginning 1949-50*

An opportunity to start a career in academic medicine is offered to young scientists with the necessary training to hold a regular faculty appointment and to conduct original research through a new program of "post-fellowship" grants, announced by the John and Mary R. Markle Foundation. The purpose of the program, according to John M. Russell, Executive Director of the Foundation, is to attract much needed talent to academic medicine by giving promising young scientists academic security and financial assistance for a period up to five years. The program will be conducted in cooperation with accredited medical schools in the United States and Canada. Grants of \$25,000, payable to the cooperating school at the rate of \$5,000 annually for a five-year period toward the support of each successful candidate or his research or both, will be available beginning with the academic year 1948-49. If the plan proves successful, the Foundation will appropriate a total of \$1,250,000 to the schools by 1953.

Candidates will be recommended by medical schools and will be limited



to young men and women with a particularly strong interest in research and teaching in any of the clinical or pre-clinical sciences or in the sciences basic to medicine. They will have had training in some special field or combination of fields to qualify them to receive a regular faculty appointment and to conduct original research. The final choice will be made, on the basis of the school's recommendations, by regional committees appointed by the Foundation. The young scientists chosen will be known as "Scholars in Medical Science." No fixed number of Scholars will be appointed in any year, but it is expected that approximately fifty will receive appointments during the five-year period. For each Scholar, the school will determine salary and academic rank, encourage research by setting reasonable limits upon teaching and other non-research activities, provide laboratory facilities, and, if necessary, make a financial contribution toward the support of his work.

The Scholar program places the emphasis on the personal qualities and scientific and teaching abilities of the men and women chosen, rather than upon particular research projects or teaching fields in which they may be interested. The program is the result of a survey of medical research and education, recently made by the Foundation, which shows that while there are scholarships and other forms of financial aid for the student in the course of his scientific training and while there are funds available to the scientist once his name is made, there are few sources of help at the beginning of the career of the man who chooses academic medicine.

A pamphlet covering the details of the plan has been sent to all deans of accredited medical schools, and persons interested in being considered as candidates are referred to them for further information.

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## Book Reviews

*Diseases of the Chest With Emphasis on X-Ray Diagnosis*. By Eli H. Rubin, M.D., F.A.C.P., F.C.C.P., Attending Physician, Division of Pulmonary Diseases, Montefiore Hospital and Country Sanatorium, New York, Visiting Physician in Tuberculosis and Physician-in-Charge, Chest Clinic, Morrisania City Hospital, New York. 685 pages, with 355 illustrations (24 plates in color). Philadelphia and London: W. B. Saunders Company, 1947. Price \$12.00.

A valuable contribution to the basic understanding of the diagnosis and treatment of diseases of the chest is presented by Eli H. Rubin, M.D., and Morris Rubin, M.D., of New York City. The authors state they are emphasizing roentgen diagnosis but they do not neglect disturbances in pathological physiology which, in the last analysis, are also essential in diagnosis and treatment. Important contributions from the literature, as well as personal experiences, are included so that the book has definite merit for the chest specialist as well as the general practitioner and internist. Excellent illustrations and roentgen reproductions are used profusely and add much to the more complete understanding of the topics presented.

The contents of the book are divided into six major sections. The initial section deals with anatomic considerations and the technical aspects of chest roentgenography including fluoroscopy, usual roentgen techniques, tomography, angiography, kymography, fluorography and mass roentgenography. The technique and importance of bronchospiro-

metry in determining the respiratory function of each lung separately is outlined carefully. The advantages of roentgen diagnosis as compared to physical examination are stressed.

The second section deals with acute and chronic pneumonias. The indications and contraindications of penicillin and the sulfonamides are tabulated adequately and the possible dangers of the sulfonamides are emphasized. The discussion of suppurative pneumonias or lung abscesses is excellent and proper emphasis is placed on the relation between medical and surgical care.

The third section of the book is concerned with pulmonary tuberculosis. The authors feel that the primary infection with the tubercle bacillus leads to early generalization and the development of scattered hematogenous foci. The importance of routine mass roentgen surveys is stressed and the authors point out that about one per cent of clinically significant tuberculosis will be found in unselected segments of the population. Of these, about one-third will have active, pulmonary tuberculosis and two-thirds arrested or inactive disease. In those patients who have developed symptoms, the onset will be insidious, catarrhal, pleural, hemoptoic or pneumonic.

The important laboratory procedures recommended for the diagnosis of pulmonary tuberculosis are frequent examinations of sputum or gastric contents for tubercle bacilli, the erythrocyte sedimentation rate and the tuberculin test. The accepted methods of examination for the recovery of tubercle bacilli are given in some detail. The authors agree that the presence of the organism is the only infallible evidence of the existence of pulmonary tuberculosis.

The decreasing incidence of complications in pulmonary tuberculosis is pointed out in the next chapter. This is thought to be due to earlier diagnosis and improved methods of treatment. The authors quote illustrative figures from the New York Municipal Sanatorium, Otisville, New York, where in 1914, 25.6 per cent of the patients examined had laryngeal tuberculosis as a complication while in 1941, the incidence had decreased to 3.6 per cent. The handling of nontuberculous conditions such as amyloidosis, syphilis, heart disease, diabetes and pregnancy when these coexist with tuberculosis is described.

The medical and surgical treatment of pulmonary tuberculosis is discussed in the following chapter. The nonspecific and specific therapeutic measures are described and pneumothorax is outlined in some detail. The authors mention BCG briefly and conclude its importance in this country is not great due to the continuing decline in the prevalence of tuberculosis. There is just a brief mention of streptomycin which is undoubtedly due to the completion of the book prior to the reports of its clinical use in tuberculosis. The surgical measures considered valuable include intrapleural and extrapleural pneumonolysis, diaphragmatic paralysis, pneumoperitoneum, thoracoplasty, cavity drainage and lung resection.

The fourth major section deals with other important diseases of the lungs and bronchi including the pneumoconioses and other occupational hazards, bronchial obstruction and bronchial asthma. The authors outline the steps necessary in making an early diagnosis of bronchiogenic carcinoma and advise the attending physician to follow the principle that any obscure lung disease occurring in an individual of cancer age is carcinoma unless proved otherwise. The increasing incidence of bronchiogenic carcinoma is ascribed to an aging population, improved

methods of diagnosis and a greater accuracy in histologic differentiation. The absence of pathognomonic symptoms and the important diagnostic measures are properly emphasized.

The fifth section of the book is devoted to diseases of the mediastinum, diaphragm, pleura and related structures, including heart-lung disease. Mediastinal abnormalities including emphysema, infections, tumors and lymph nodes are described fully. The chapter on the diagnosis of pleural effusions will be found valuable by the physician. The authors point out the difficulties encountered in making a definite diagnosis of the underlying disease in primary pleural effusion.

The concluding section of the book covers the principles of surgical treatment, emphasizing preoperative and postoperative care. The differences, from a surgical standpoint, between the individual with acute suppurative disease of recent origin and the chronically ill patient with chronic pulmonary suppurations, bronchiectasis, neoplasms and tuberculosis are stressed from the standpoint of preoperative medical care and the frequency of postoperative complications. Bronchoscopic examination to determine the operability of neoplasms, the exact localization of abscesses and the presence or absence of endobronchial tuberculosis prior to the induction of pneumothorax is recommended. Brief discussions of surgical technique are included, as the authors state, in order to enable the student to appreciate what the thoracic surgeon is doing. The final chapter deals with chest emergencies and includes treatment of traumatic hemothorax, traumatic and tension pneumothorax, crushing chest wounds and thoraco-abdominal injuries.

The authors have included an excellent bibliography for each subject discussed and the contents are well indexed. There are few typographical errors. There is one error of some importance on page 81 where the dosage of sulfadiazene is given by the authors as approximately 0.5 gm per pound where 0.05 gm per pound is probably meant. This book can be recommended to all physicians interested in diseases of the chest.

Sumner S. Cohen, M.D.

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Review of Dr. Francis Kovats' book "*Pulmonary Tuberculosis*," Budapest, 1945, by A. Rottmann in the *Wiener medizinische Wochenschrift*, No. 4, 1947.

This book of the well-known Hungarian research worker and Professor of Diseases of the Lung, University of Budapest, is one of the best contributions which have been published recently in this particular field. It is particularly welcome today, for it points toward new therapeutic measures against this tremendously increased endemic disease. This book is an outstanding one in this respect. As stated by the author in the introduction, the work is based predominantly on empiricism, and on the basis of his wide experience, he offers important and enlightening data relative to theoretical concepts pertaining to this subject. A close portrayal of the evolutionary changes of tuberculosis gives a clear understanding of its problems. Very properly, the author emphasizes the extreme importance of x-ray in the diagnosis of tuberculosis and accordingly there is an excellent selection and reproduction of 223 roentgenograms and diagrams which bring to light the standard as well as the more unusual diagnostic features of this disease. He emphasizes the importance of proper training and experience in roentgenologic technique and diag-

nosis as indispensable for clinical work. The clinical classification of the disease is presented in a concise and easily understandable manner. With regard to treatment, adequate emphasis is placed on various forms of collapse therapy. A masterful survey of the subject, together with a clear and penetrating presentation of the material render this book a fundamental source of information for chest physicians as well as for the general practitioner.

Andrew L. Banyai, M.D.

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## Obituaries

### DRUE KING

1887 - 1947

Dr Drue King was born in Augusta, Georgia, on March 16, 1887, the youngest of 14 children. He attended public school in Atlanta and then in Boston, and completed high school in Boston. He graduated from Tufts Medical College in 1914 and interned at John Andrew Memorial Hospital in Tuskegee, Alabama. At the expiration of his internship he returned to Augusta where he entered into private practice. In 1925 he was appointed to the position of Ward Surgeon at the Veterans Hospital in Tuskegee, Alabama. In 1927 Dr. King studied at the Laennec Clinic in Paris, France.

Dr. King was a Certified tuberculosis specialist and Senior Physician in point of Service on the staff of the Veterans Hospital, Tuskegee, Alabama. He served the Veterans Administration faithfully for 24 consecutive years.

On April 17, 1947, Dr. King suffered a cerebral hemorrhage. He died on April 20. He leaves to mourn his loss, a wife and two sons: the elder, Drue Jr., a recent graduate of Harvard College and now a medical student at Tufts Medical College, and the younger, Abram Oliver, a pre-medical student at Boston College.

Roy A. Wolford, M.D., Governor for the Veterans Administration

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### LEE T. FERRELL

1879-1947

Dr. Lee T. Ferrell was born October 23, 1879, at Hazelhurst, Mississippi. He was graduated from the Medical School of the University of Tennessee in 1911 and engaged in private practice in Murphy, Mississippi from 1911 to 1918. He served with the Medical Corps of the United States Army during World War I and entered the Veterans Administration service in December, 1920. He died on February 3, 1947, and is survived by his wife, Mollie Clancy Ferrell, and a son, Lieutenant Colonel Lee T. Ferrell Jr., who is in the United States Army Medical Corps, Washington, D. C.

Dr. Ferrell was for a number of years on the staff of the Veterans Hospital at Albuquerque, New Mexico, and was highly respected by his associates and the medical fraternity in Albuquerque.

Robert O. Brown, M.D., Governor for New Mexico

**JOHN DONNELLY**

1878 - 1947

Dr John Donnelly was born at Connellsville, Pennsylvania, in 1878. At the age of eight his family moved to Charlotte, in Mecklenburg County, North Carolina. He was an honor student in the Charlotte public schools and at the University of North Carolina, where he won the degree of Bachelor of Arts and Doctor of Medicine.

Dr Donnelly first engaged in the practice of medicine in Hillsboro, North Carolina, where he remained for only two years. He returned to Charlotte and soon was appointed to the faculty of the North Carolina Medical College. He was especially interested in tuberculosis and chest diseases. He developed an active tuberculosis and chest clinic, and though the school was discontinued in a few years, he continued the chest clinics in the City Health Department. He volunteered for service in World War I, in which he served with fidelity and distinction. With this war over, Dr Donnelly came home and again resumed his warfare against tuberculosis.

A few years later, largely through sentiment developed by Dr Donnelly's unremitting labors, Mecklenburg County provided a Sanatorium for the care of its tuberculous, and Dr Donnelly was made its first superintendent and medical director, in which capacity he served for ten years. On resigning from the Sanatorium, Dr Donnelly did private practice in Charlotte in diseases of the chest, and supervised the chest clinic for the City Health Department.

Due to hypertensive cardiovascular disease, his practice was necessarily limited for the last two or three years of his life. However, he was very actively interested in all the proceedings of the College until his death on April 16, 1947.

*M D Bonner, M.D , Governor for North Carolina*

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**WALTER H WATTERSON**

1875-1947

Dr Walter H Watterson was a pioneer in the field of tuberculosis work in Illinois. His interest in tuberculosis was prompted by the fact that he was a patient himself in the days before the modern conception of treatment. He began practice at the age of 26. At 29 he had to take time out and "Go West." Several years later he established a tent colony for the tuberculous at Waukegan, Illinois (1908). He later was chief of Tuberculosis Service at Oak Forest from 1914-1916. In 1917-1918 he was medical superintendent of the Chicago Municipal Tuberculosis Sanatorium. He saw army service in 1918-1919 and for fourteen years following he was medical director of Zace Sanatorium at Winfield, Illinois. An acute illness forced his retirement. For over a year he was unable to work but later returned to a very active private practice in which he was engaged when he succumbed to a coronary occlusion on June 17th at the age of 72 years at his home in LaGrange, Illinois.

*Robert K Campbell, M.D , Governor for Illinois*

## IRA. D NELSON

1878 - 1946

The death of Dr Ira D Nelson on October 6, 1946, at Albuquerque, New Mexico, closed the career of a highly respected and valued physician and worker in the field of public health, particularly in tuberculosis, in the United States Indian Service. Dr Nelson was born near Keokuk, Iowa, on September 11, 1878, graduated from Iowa Medical College in 1904, and took postgraduate work at the Mayo Clinic and the University of Minnesota. He began a long and valued career in the United States Indian Service during World War I, serving at many Indian Agencies, and as Superintendent at the government sanatoria at Rapid City, South Dakota, Toledo, Iowa, and at Claremore, Oklahoma. His success in work with tuberculosis, and in building up hospitals, was recognized in his appointment as Executive Medical Officer for the United Pueblos Agency and as Physician in Charge of the United States Indian Service Tuberculosis Sanatorium at Albuquerque, New Mexico, as well as of four other hospitals in the Southwest, until failing health forced his retirement from active duties.

Dr Nelson, who was a Fellow of the American Medical Association, as well as of the American College of Chest Physicians, is survived by his widow, now living in Wellington, Kansas, two daughters, and a son, the latter a Medical Officer in the Army of Occupation in Germany.

Robert O Brown, M.D., *Governor for New Mexico*

## JAHARLAL GHOSH

1907 - 1946

We regret that reports of the death of Dr Jaharlal Ghosh have been confirmed. Dr Ghosh was born in Dinaipur, Bengal, India. He received his medical degree from the University of Calcutta in 1932, and took postgraduate work at the Carmichael Medical College, Calcutta, and the Brompton Hospital, London.

Dr Ghosh entered private practice in Calcutta and was also Clinical Tutor in Medicine and Lecturer in Medical Anatomy and Physiology at the Carmichael Medical College there. He was a Fellow of the American College of Chest Physicians, and served as Governor of the College for India, and a member of the Indian Medical Association, the Royal College of Physicians, London, and the Royal College of Surgeons, England.

Ramon Viswanathan M.D. *Governor for India*

## PUBLIC HEALTH SERVICE AWARDS FOR MEDICAL RESEARCH

Public Health Service awards for basic medical research have totalled \$10,214,174 during the past twenty months. Six hundred twenty-nine scientists in 193 institutions shared in these grants. Broken down into major categories of medical research, the total amounts and total number of projects are as follows:

Antibiotics, 27 projects, \$249,698, Bacteriology, 43 projects, \$445,689, Biochemistry and Nutrition, 49 projects, \$682,358, Cancer, 114 projects, \$1,241,510, Cardiovascular, 31 projects, \$703,187, Dental, 25 projects, \$135,607, Gerontology, 11 projects, \$213,172, Hematology, 33 projects, \$498,833, Malaria, 21 projects, \$543,208, Mental Health, 28 projects, \$276,127, Metabolism and Endocrinology, 30 projects, \$267,359, Pathology, 21 projects, \$176,545, Pharmacology, 30 projects, \$313,779, Physiology, 52 projects, \$676,836, Public Health Methods, 9 projects, \$125,843, Radiobiology, 16 projects, \$392,399, Rodent Control, 2 projects, \$17,120, Sanitation, 25 projects, \$202,545, Surgery, 16 projects, \$159,910, Syphilis, 46 projects, \$1,669,793, Tropical Diseases, 20 projects, \$352,987, Tuberculosis, 19 projects, \$360,113, Virus and Rickettsial, 31 projects, \$509,556

## *The George Washington University School of Medicine*

### A N N O U N C E S

#### THIRD ANNUAL SERIES OF INTENSIVE POSTGRADUATE COURSES

Thoracic Surgery and Endoscopy ..... March 1-5, 1948

Thoracic Medicine ..... March 8-12, 1948

Internal Medicine (including

Thoracic Medicine) ..... March 1 - April 16, 1948

#### A DISTINGUISHED GUEST FACULTY WILL SUPPLEMENT THE LOCAL STAFF

Numerous other courses are also available. Registration in each course is limited. Veterans can use their benefits under the G. I. Bill of Rights. Hotel accommodations are available. For further details write:

Director of Postgraduate Instruction

The George Washington University School of Medicine  
1335 H Street, N. W. — Washington 5, D. C.

## Medical Service Bureau

In accordance with a resolution adopted by the Board of Regents of the College at their annual meeting held in Chicago on June 17, 1945, a Medical Service Bureau has been established at the Executive Offices of the College for the purpose of serving the members of the College being released from the armed forces

The Bureau would appreciate receiving information from the medical superintendents of sanatoria regarding positions available at their institutions together with full particulars as to the type of position and salary offered. Fellows of the College who are looking for assistants should send complete information to the Bureau

Physicians being released from the armed forces who are seeking appointments and positions should send complete information to the Bureau regarding their training and the type of position desired.

Please direct all correspondence to the Medical Service Bureau, American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

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### POSITIONS AVAILABLE

Assistant Resident Physician with some tuberculosis experience wanted for 120-bed bi-county institution All phases of the diagnosis and treatment of tuberculosis are carried out including major surgery California license required although not immediately Furnished apartment is provided for single person or married couple Please outline training and experience in first letter and include a recent snapshot Salary starts at \$425 00 per month. Write Director Tulare-Kings Counties Joint Tuberculosis Hospital, Springville, California

Assistant Medical Director wanted 170-bed tuberculosis hospital Completely equipped thoracic surgery department x-ray, laboratory and rotating staff Salary open Please address Mahoning Tuberculosis Sanatorium 4880 Kirk Rd Youngstown 7, Ohio

Resident physician for 500-bed hospital wanted providing all facilities in connection with hospital care out-patient service with every agency that is not being employed in the treatment of tuberculosis and other diseases of the chest. Compensation in accordance with previous experience Maintenance for the physicians no provision for families Berthold S Pollak Hospital for Chest Diseases B S Pollak, M.D. Medical Director 100 Clifton Place Jersey City 4 New Jersey

Tuberculosis residency available, salary \$250 to \$350 per month for single man must be graduate of American medical school For further information please address Box 173A, American College of Chest Physicians 500 N Dearborn Street, Chicago 10 Illinois

Young physician wanted single, having served his internship and preferably having had a little experience in tuberculosis 180-bed sanatorium

good opportunity for the right man, salary \$2400 per year and maintenance Dr W A Bridges Supt and Med Dir Endowood Sanatorium Towson 4 Maryland

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### POSITIONS WANTED

Physician soon to be released from service desires residency in chest diseases Experience includes an approved rotating internship one year in an approved tuberculosis sanatorium, and at present on large tuberculosis service in Navy Age 27, married, one child For further information please address Box 234A, American College of Chest Physicians 500 North Dearborn Street Chicago 10 Illinois

Well trained chest surgeon bronchoscopist qualified for the American Board of Surgery interested in an association with established clinic or a position in hospital or sanatorium with opportunity for private practice For further information please address Box 235A American College of Chest Physicians 500 N Dearborn Street Chicago 10 Illinois

Well trained chest surgeon desires position in an institution or an association with another chest surgeon For further information please address Box 236A American College of Chest Physicians, 500 North Dearborn Street, Chicago 10 Illinois

Fellow American College of Chest Physicians, chest surgeon, bronchoscopist, well trained formerly member of university teaching staff, is interested in position with hospital or sanatorium with opportunity for private practice or in association with well established clinic For further information please address Box 237A American College of Chest Physicians 500 N Dearborn Street, Chicago 10, Illinois



## Reprints, Books and Reports Received

- 1 Radiology Section XIV, of Excerpta Medica Vol I, No 1 June 1947
- 2 Epidemiologia de la Tuberculosis en Chile Dr Benjamin Viel, 1946
- 3 'Pneumothorax et Activite Locale du Foyer Tuberculeux Pulmonaire,' Revue Belge de la Tuberculose, September-October 1938
- 4 "La Richesse Des B.K en Granulations Gramophilles au Cours de la Tuberculose Pulmonaire, Revue de la Tuberculose April 1938
- 5 "Tomografia del Torax en Cortes Metamericos," Anales de La Catedra de Patologia Y Clinica de La Tuberculosis June 1945
- 6 'Reactions to Penicillin ' by Sidney Dressler M.D, and Ralph E Dwork, M.D Journal of American Medical Association March 22, 1947
- 7 Tuberculosis Case Finding by John A Foley, M.D and John B Andosca M.D New England Journal of Medicine December 5 1946
- 8 "The Significance of the Retracted and Curved Horizontal Fissure of the Lungs" by Ralph E Dwork, M.D American Journal of Roentgenology and Radium Therapy, March 1947
- 9 Annual Report for the Year 1946, Erie County Tuberculosis Hospital, Erie Pa
- 10 Annual Report for Year Ending November 30, 1946 Du Page County Tuberculosis Sanatorium Board.
- 11 "El Embolismo Pulmonar" by Egidio S Mazzei M.D Diego Taylor Gorostiza, M.D Elyser Magalhaes M.D El Ateneo 1947
- 12 "Tuberculosis Case Finding," by Carl C Birkelo, M.D, W Edward Chamberlain, M.D Paul S Phelps M.D Percy E Schools M.D, David Zacks M.D Jacob Yerushalmy, M.D Journal of American Medical Association, February 8, 1947
- 13 'Prospects for Prevention of Chronic Bronchitis and Bronchiectasis ' by Walter Finke M.D, Scientific Exhibits of 5th International Congress of Pediatrics, July 14-17 1947, New York, New York
- 14 'Notes Sur une Manifestation Connexe de la Primo-Infection L'Erytheme Nouveau, Ses Rapports Chronologiques Avec les Stades de la Maladie Tuberculeuse by Rene Jeanneret, M.D Journal Medical de Leysin February 1943
- 15 "Tomographie et Pratique Phtisiologique Radiologica Clinica, March 1944
- 16 'A Propos du Pneumothorax Mixte Intra et Extra-Pleural Associe Revue Medicale by Rene Jeanneret M.D, and Rancols de Kovats, M.D June 25 1944
- 17 Kystes Gazeux du Poumon by Rene Jeanneret M.D and Henri Mean M.D, Revue Medicale de la Suisse Romande November 25 1940
- 18 'A Propos des Ombres Radiologiques Fugaces,' by Rene Jeanneret, M.D and F Fame M.D Revue de la Tuberculose December 1933
- 19 'Reprise Eloignee des Fonctions du Diaphragme Apres Phrenicectomie,' by Rene Jeanneret M.D M Ribert M.D and F Fame M.D, La Presse Medicale May 9 1934
- 20 La Pleuroscopie et la Section des Brides Pleurales dans le Pneumothorax Artificiel " by Rene Jeanneret M.D, and F Fame M.D Helvetica Medica Acta, Vol 2, 1936
- 21 'Indications et Resultats de la Phrenicoexereses dans la Tuberculose Pulmonaire de L'Adulte," by Morin, Cardis, and Michetti, 'A Propos de la Phrenicectomie' by Piguert and Rene Jeanneret  
'Communication des Resultats de 27 Phrenicectomies, by Rossell  
'La Retraction Elective Dans La Phrenicoexereses' by Cardis and Joannette, Societe des Medecins de Leysin, July 4, 1929
- 22 Note Sur les Endometriomes,' by Rene Jeanneret, M.D Revue Medicale de La Suisse Romande, November 25, 1926
- 23 Une Application Pratique de la Methode de Desensibilisation par les Cuti-Reactions Repetes " by Rene Jeanneret M.D., Revue Medicale de la Suisse Romande February 25, 1929
- 24 'Deux Cas de Chorio-Epithelioma Malin Chez L'Homme, by Rene Jeanneret, M.D Schweizerischen Medizinischen Wochenschrift, 1928
- 25 Frequence et Comportement de la Tuberculose Chez les Etudiants en Medecine des Universites Suisses' by Rene Jeanneret M.D, Revue Suisse de la Tuberculose, Vol II, 1945
- 26 'Une Complication Rare de la Collapso-therapie Gazeuse," by Rene Jeanneret M.D Revue Suisse de Medecine, May 15 1941
- 27 'Note Sur la Pleuroscopie et les Sections D'Adherences " by Rene Jeanneret M.D, and Andre Gilliard M.D Journal Suisse de Medecine, No 6 1942
- 28 La Pleuroscopie et la Section Des Adherences Pleurales Dans le Pneumothorax Artificiel," by Rene Jeanneret Tuberculose Cours de Leysin, 1944
- 29 'A propos de L'Aspiration Intra-Cavitaire des Cavernes Pulmonaires,' by Rene Jeanneret, Journal Medical de Leysin June 1943
- 30 'Section D'Adherences et Collapsotherapie Gazeuse Efficace Chez un Diabetique, Tuberculeux-Pulmonaire by Rene Jeanneret M.D Journal Suisse de Medecine No 23 1940
- 31 A Propos de Procede D'Aspiration Intra-Cavitaire des Cavernes Pulmonaires Selon Monaldi," by Rene Jeanneret, M.D, and Gustave Joyet Revue de la Tuberculose July 1939
- 32 A Propos du Chorio-Epithelioma Malin Chez L'Homme " by Rene Jeanneret, M.D, Presented to the Faculty of Medicine of Lausanne University to obtain a Doctor of Medicine
- 33 Essai de Caissement des Adenopathies Tracheo - Bronchiques Tuberculeuses du

- Jenne Adulte by Rene Jeanneret, M.D. and F Fame M.D. *Revue Medicale de la Suisse Romande*
- 34 'A Propos de la Localisation Radiologique des Adenopathies Tracheo-Bronchiques by Rene Jeanneret, M.D. and F Fame, M.D. *Revue de la Tuberculose* February 1932
- 35 "L'Image Radiologique de la Broncho-Pneumonie Grippale," by Rene Jeanneret, M.D., and F Fame M.D., *Revue Medicale de la Suisse Romande*, June 10, 1931
- 36 "Note Sur L'Image Radiologique des Processus Pulmonaires Exsudatifs," by Rene Jeanneret, M.D. and F Fame M.D. *Schweizerischen Medizinischen Wochenschrift* 1931
- 37 "Contributo Allo Studio del Lobo Accessorio Della Vena Azigos by Rene Jeanneret M.D. *Revista di Patologia e Clinica della Tuberculosis* Anno V
- 38 "Note Sur L'Operabilite des Adherences Apico-Mediastinales et Sur Leur Role dans L'Inefficacite du Pneumothorax by Rene Jeanneret M.D. and Victor Keser M.D. *Journal Medical de Leysin* July-August 1939
- 39 "Les Livres et la Lecture dans les Etablissements de Cure Pour Tuberculeux, by Rene Jeanneret M.D., *Revue Medicale de la Suisse Romande*, September 1938
- 40 'A Propos du Pronostic des Pleuresies Exsudatives by Rene Jeanneret M.D. and Andre Vaquette *Revue Medicale de la Suisse Romande* June 25 1938
- 41 "Pneumothorax Therapeutique et Epilepsie by Rene Jeanneret M.D. and A Vaquette M.D., *Journal Medical de Leysin* September-October 1937
- 42 Faits Cliniques et Anatomiques by Rene Jeanneret, M.D. and Willy Froehlich M.D. *Journal Medical de Leysin*, December 1932
- 43 'A Propos de la Phrenicectomie dans le Traitement de la Tuberculose Pulmonaire by Pigue Jeanneret Froehlich, *Journal Medical de Leysin* February 1931
- 44 'A Propos des Corps Libres Intra-Pleuraux by Pigué and Jeanneret *Bulletin Medical de Leysin* February 1930
- 45 "Granulation Tuberculeuse presentation d'un document radiologique by Rene Jeanneret, M.D.
- 46 "Incidencia da Infecção Tuberculosa Nos Universitários Do Rio de Janeiro by Drs A MacDowell, Reginaldo Fernandes L Arantes de Almeida J M Castello Branco Roberto Pereira, Olympio Gomes Cesar de Almeida Arnaldo de Barros A MacDowell Filho Carlos Saboia, Affonso Bernardinelli Tarantino e Epilogo de Campos
- 47 Pneumotorax espontaneo com enfisema do mediastino' by Affonso MacDowell Filho
- 48 Pneumotorax hipertensivo na sínfise frouxa post-reexpansão aguda by Affonso MacDowell Filho
- 49 Pneumotorax de reinstalação by Dr Affonso MacDowell Filho
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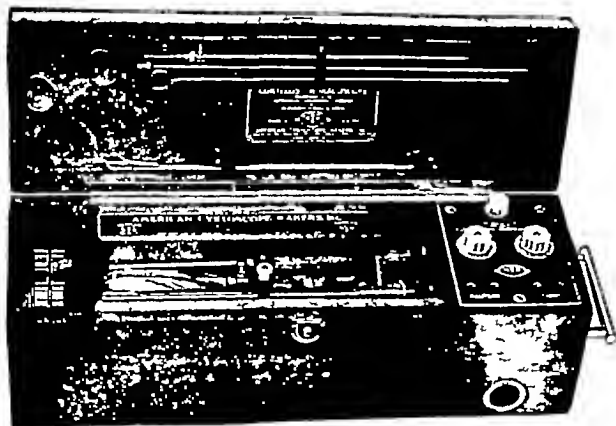
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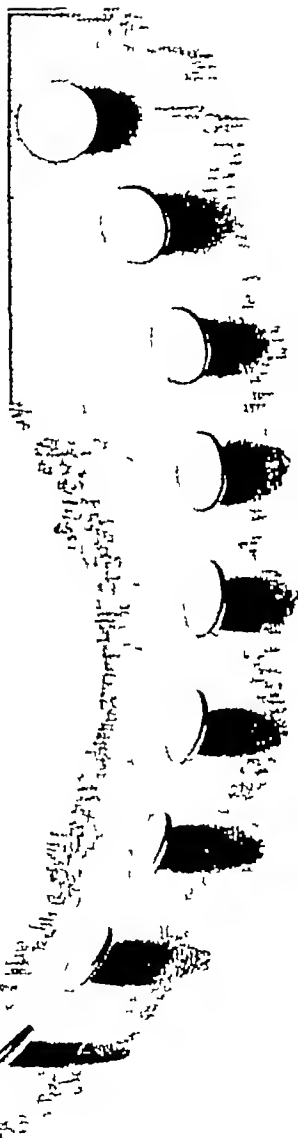
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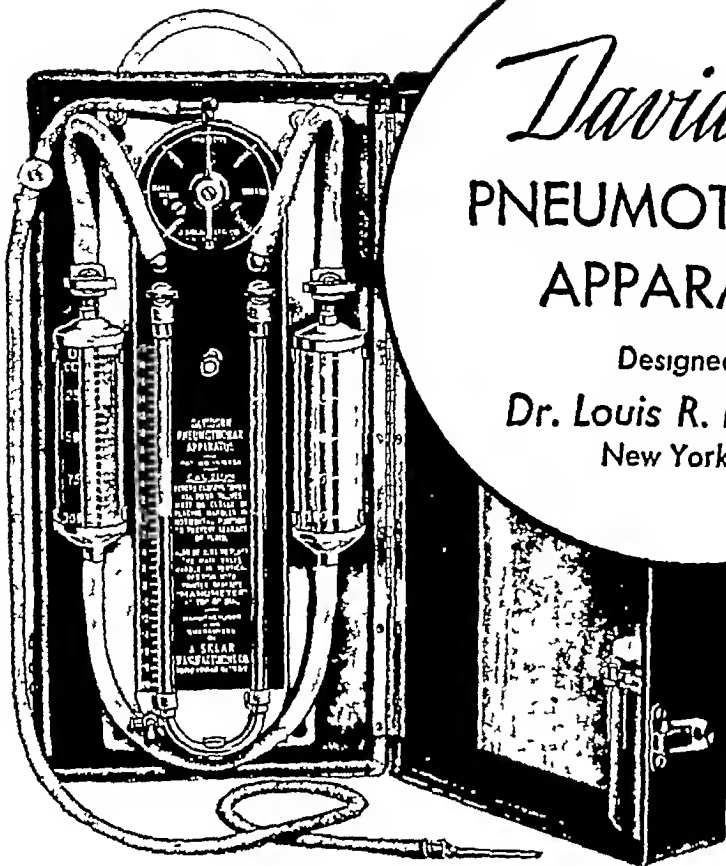
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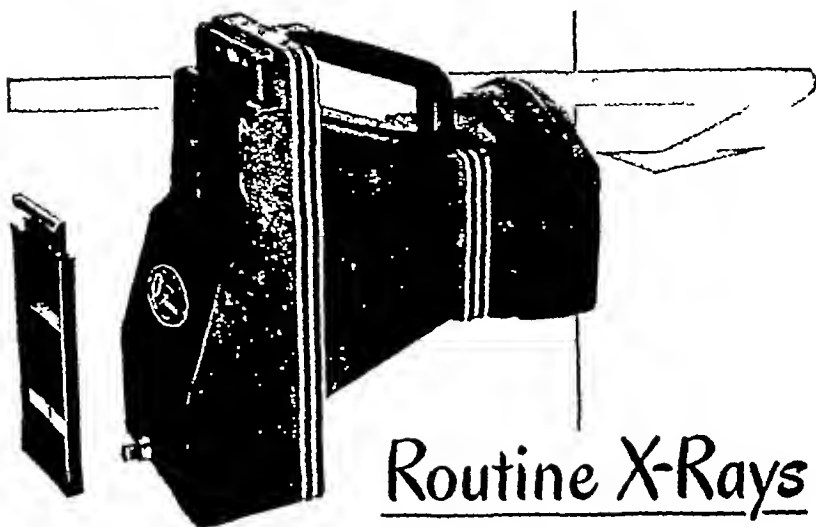
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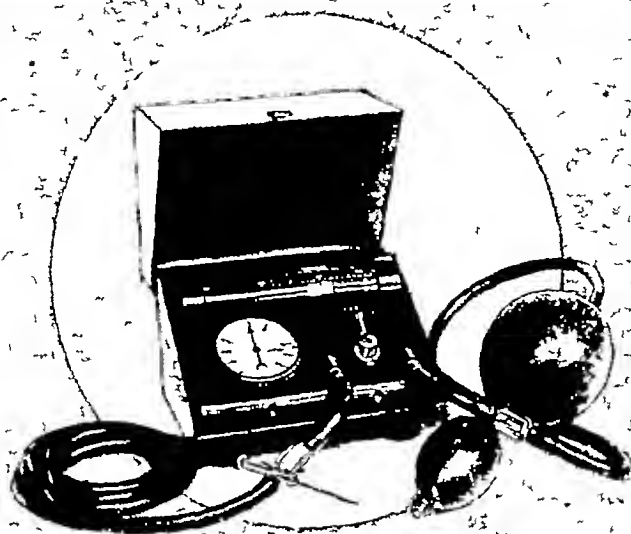


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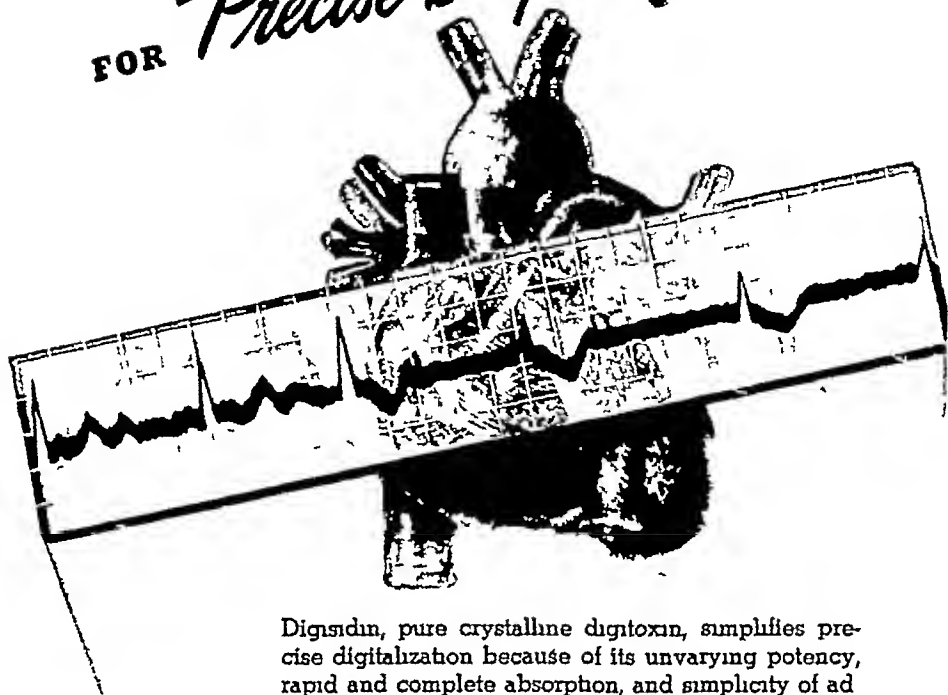
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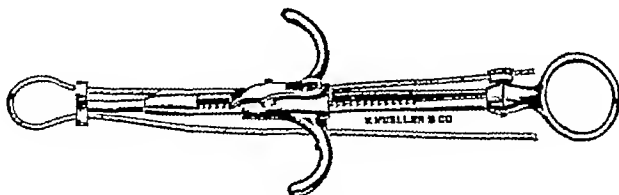
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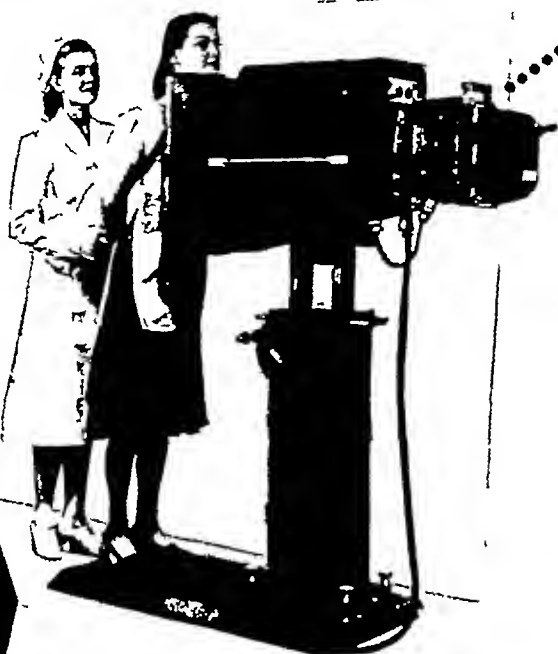
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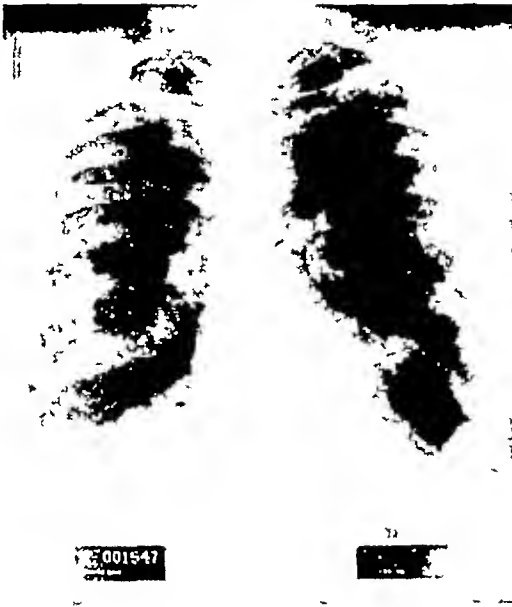
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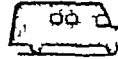
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# DISEASES *of the* CHEST

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VOLUME XIII

SEPTEMBER-OCTOBER 1947

NUMBER 5

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## Pleurisy with Effusion Associated with Pseudomucinous Cystadenoma (Meig's Syndrome)

ERNEST D. NORA, M.D.  
RICHARD M. DAVISON, M.D., F.C.C.P.  
*Chicago, Illinois*

The general paucity of information, relative to a syndrome of the hydrothorax with benign ovarian tumors and ascites, has too frequently led to a diagnosis of malignancy with chest metastasis. It is the object of this paper to review the literature, analyze thirty-seven cases, and to present another case which is unusual from the standpoint of tumor pathology. There is only one similar case presented in the literature.

The association of ovarian tumors with ascites has not been an uncommon thing. Boldt<sup>1</sup> in 1910 reported a case of an ovarian fibroid tumor with ascites, and Titus<sup>2</sup> in 1913, in a discussion of a fibroma of the ovary, stated that ascites was an accompaniment in about half of the cases. In 1914 Fullerton<sup>3</sup> commented on the frequent early occurrence of ascites in cases of a fibroid tumor of the ovary. In 1914 Hellman<sup>4</sup> reviewed the literature and found that ascites was associated with at least five per cent of all of the cases of ovarian fibroma, which is considerably less than Titus and Fullerton would lead us to believe. Reel,<sup>5</sup> Saint,<sup>6</sup> Richardson,<sup>7</sup> Macdonald,<sup>8</sup> and Owen<sup>9</sup> all presented similar cases between the years of 1917 and 1923. Although Owen mentioned the fact that hydrothorax might occur with ascites and ovarian tumor, he presented no evidence to substantiate his statement. Hoon<sup>10</sup> in 1923, in review of all of the cases of ovarian fibroma of the Mayo Clinic from 1910 to 1921 mentioned two with a hydrothorax and ascites which disappeared after surgical removal of the tumor. Salmon<sup>11</sup> presented two cases in 1934 and stressed the association of a

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\*From the Service of Dr. Frederick Tice, aided by the Cuneo Research Foundation.

hydrothorax with benign pelvic tumors with ascites and pleural effusions, however, it was not until 1937 that this association was recognized as a syndrome. At this time, Meigs and Cass<sup>12</sup> reported Hoon's two cases, a case of Leo's, and four additional cases from the records of the Massachusetts General Hospital. They emphasized the fact that the hydrothorax and ascites cleared up quickly after surgical removal of the tumor.

This work inspired such an interest in the syndrome that a number of cases, old and new, literally sprang into the literature. The earliest recorded case was that of Cullingworth's<sup>13</sup> in 1879. Apparently, his patient died from non-treatment. The necropsy revealed a left hydrothorax with a collapsed left lung, congestion and edema of the right lung, marked ascites, bilateral large solid tumors of the ovary, and a thickened pleura and peritoneum. Tait<sup>14</sup> presented a second case in 1890 of a left hydrothorax, marked ascites, and a large round solid tumor. Since malignancy was suspected, an operation was postponed. Thirty paracenteses were done with no relief to the patient. Several thoracenteses had been performed previously with apparent cure of the condition. After the tumor was removed, the patient made a slow recovery, which was interrupted only by the formation of a retrouterine abscess. This abscess cleared up after opening and drainage.

In 1937 Rhoads and Terrel<sup>16</sup> presented a case, Weld,<sup>15</sup> in 1938, presented two cases. In 1940 Bomze and Kirshbaum<sup>17</sup> presented two cases. In the next two years Harris and Meyer,<sup>18</sup> Henderson,<sup>19</sup> Lock and Collins,<sup>20</sup> Jones,<sup>21</sup> Glass and Goldsmith,<sup>22</sup> and Ritvo<sup>23</sup> added six cases to the list. In 1943 and 1944 an additional six cases, all of benign ovarian fibroma associated with ascites and hydrothorax, were presented by Herrick, Tyson, and Watson,<sup>25</sup> Keleman,<sup>26</sup> Clay, Johnston, and Samson,<sup>27</sup> Mendel and Tyrone,<sup>28</sup> and Gardiner and Lloyd-Hart.<sup>29</sup>

A case similar to our case was presented by Macfee<sup>24</sup> in 1941. Although the tumor was a multilocular cystadenoma, a variation from the usual fibroma, it, with ours, fits into the symptom complex emphasized by Meigs and Cass.

A case was presented by Millett and Shell<sup>30</sup> early in 1945 that is almost identical to our case. The patient, 39 years old, complained of dyspnea on mild exertion. The examination, confirmed by fluoroscopy, revealed a right hydrothorax and an enlarged abdomen. She had no gastric distress, no peripheral edema, and no urinary symptoms. Her menses were regular until three months previous to the examination. During that month she menstruated twice. A thoracentesis was done on the day of admittance, twice before surgery, and once on the twelfth postoperative day. Cultures and guinea pig examinations of the fluid were negative. The

laparotomy revealed a moderate amount of fluid, a large ovarian cyst, later found to be a pseudomucinous cystadenoma, and several mucinous implants on the peritoneum. The patient made an uneventful recovery.

### CASE HISTORY

A white female, A F, forty-two years old, was admitted to the hospital on January 4, 1945, complaining of anorexia and pressure in the epigastric region. The patient's family history was negative. She had been married ten years and never able to become pregnant. Menstruation began at the age of eighteen with no irregularity until the early part of 1944, at which time her periods varied from two to ten and twelve days, and sometimes she did not menstruate at all. She also noticed distention of her abdomen.

In August 1944, she was told that she had a pleural effusion. Several thoracenteses were done which partially relieved her dyspnea. Six weeks prior to admission to the hospital, the doctor told her that she had an abdominal tumor and hydrothorax. Four thoracenteses were done.

The only abdominal symptom the patient had was the "pressure feeling." Just before her first aspiration, her left lower extremity became edematous from the foot to the knee. The edema receded completely after the aspiration. She was aspirated at two to three week intervals, and at each of the four aspirations approximately two liters of fluid were removed. Cultures of the fluid were sterile, guinea pig inoculations were negative for tuberculosis, and the fluid had the appearance of a transudate.

A physical examination revealed that the thoracic respiratory expan-

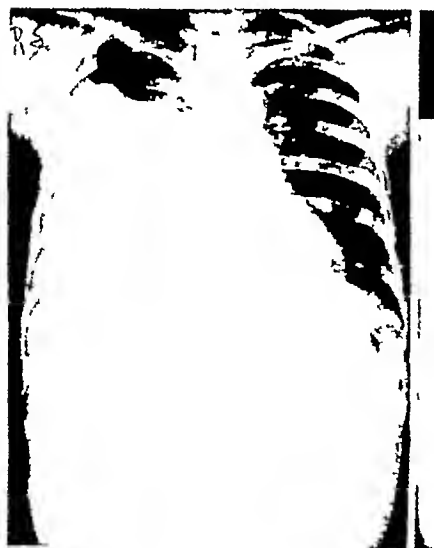


Figure 1

Figure 1 X-ray of the line of pleural effusion on August 13 1944



Figure 2

Figure 2 X-ray of the line of pleural effusion on September 12 1944



sion was the same bilaterally even though a thoracentesis had been performed just before the examination Prior to the thoracentesis, the right intercostal spaces were larger On palpation, an increased vocal phremitus was elicited on the left and upper part of the right side Percussion revealed a normal pulmonary resonance at the right upper lobe There was a dullness and even a flatness at the base of the right lung up to the third intercostal space Auscultation revealed bronchovesicular respiration in the left side Clinically, there was no evidence of any parenchymal consolidation No murmurs or extrasystoles were present in the heart, and there was no arrhythmia There was a collateral venous circulation in the anterior wall of the chest

Examination of the abdomen revealed an engorgement of the superficial veins A large tumor mass was palpated It extended five centimeters above the umbilicus The surface appeared smooth to the touch, and it was painless to palpation The mass was situated in the hypogastric region and resembled a uterus almost at full term The liver and spleen were not palpable The Blood Count, Urinalysis, and Kahn were negative The impression was that it was either a malignancy of the internal genitalia with metastasis to the lung or a Meig's Syndrome

The patient was operated on January 5, 1945, and a large ovarian cyst, weighing 4,200 grams, was removed The peritoneum was adherent and studded There was miliary studding on the surface of the liver, and ascites A tube was inserted in the right chest cavity

The Pathological Examination revealed a multilocular, grayish red, mucinous cyst It was filled with a stringy, gray, mucinous fluid which was not precipitated by Acetic Acid The daughter and granddaughter cysts varied in size from a split pea to a small orange There were many gray, necrotic areas in the cyst wall of the parent cyst, which extended into the daughter and granddaughter cysts



Figure 3



Figure 4

Figure 3 X-ray of the line of pleural effusion on October 30, 1944

Figure 4 Note clearness of chest on December 10, 1945, one year after surgery

The Microscopic Examination revealed the typical pallisading of tall columnar cells with large quantities of degenerated, colloidal material having a rather reddish hue No definite evidence of anaplasia was encountered

*Diagnosis* Pseudomucinous cystadenoma of the ovary

On the first postoperative day 175 cc of fluid were aspirated from the chest By the third postoperative day, no further tendency to fluid development was observed, and the tube was removed, however, the wound did not heal satisfactorily, and some omental tissue was protruding from the wound On the fourteenth postoperative day, a secondary closure was done after removal of some of the omental tissue A microscopic examination of the omental tissue revealed an acute peritonitis with some pseudomyxomatous peritoneal implants

An x-ray of the patient's chest on January 19, 1945, showed a circular area of infiltration at the right base at the level of the dome of the diaphragm with a corresponding fluid level The patient was discharged from the hospital in a good condition February 2, 1945 X-ray of chest in January, 1946 revealed no fluid

In analyzing the thirty-eight cases listed, we find that the tumors most frequently occur during the menopause or just before It is especially significant to chest men that of the thirty-eight cases of ovarian tumor and ascites, seventeen were in the abdomen only In all of the cases, cultures made of the fluid were sterile, and the fluid was a transudate devoid of malignant cells

There seems to be no relationship between the amount of hydro-peritoneum and hydrothorax Fifteen cases had marked ascites, thirteen cases had relatively small amounts of fluid In five of the cases the amount of fluid was relatively large, and the pleural effusion was relatively small In three cases the amount of fluid was small in both the chest and abdominal cavities



Figure 5

Microscopic section revealing the lining of the cyst wall which reveals pallisading tall columnar epithelium

Case No	Author	Year	Site of Pleural Effusion	No of Thoracenteses and Amount	Preoperative Paracenteses	Operative Abdominal Effusion	Type of Tumor	Location of Tumor	Chief Complaint
1	Cullingworth	1879	Bilateral	None	None	Died before surgery	Fibroma	Both ovaries	Metrorrhagia Dyspnea Ascites
2	Tait	1891	Bilateral	Repeated	30	Large amount	Fibroma	Right ovary	Abdominal swelling
3	M G H	1901	Right	80 ozs 62 ozs 68.5 ozs 58 ozs 48 ozs	2 On 2nd one over 6 pts	Considerable amount	Fibroma	Not reported	Pain in right chest
4	M G H	1902	Right	5 2-4 qts	None	6-8 qts	Fibromyoma	Right ovary	Pleurisy
5	M G H	1908	Right	8 ozs 8 ozs 8 ozs 8-10 ozs 2 qts	18 pts 14 pts 15 pts 18 pts 260 ozs	Several quarts	Fibroma	Left Broad Ligament	Pain in shoulder, especially in the left one
6	Hoon	1917	Left	1	None	6-8 qts	Fibroma	Right ovary	Cough Bloating of abdomen.
7	Hoon	1920	Right	40 ozs 60 ozs 1800 ccs	6500 ccs	Several liters	Fibroma	Right ovary	Bloating Pain between scapula
8	Leo	1926	Right	Repeated 1000 ccs every few days	None	Large amount	Benign	Left ovary	Dyspnea Pain in chest

9	de Rouville et al	1928	Left	1	9	1000 ccs	Fibroma	Right ovary	Cough Emaciation
10	Bomze and Kirschbaum	1930	Bilateral	None	None	Present	Fibroma	Left ovary	Pain in abdomen with lower abdominal mass
11	Salmon	1932	Right	1500 ccs 1500 ccs 2000 ccs	None	500 ccs	Fibroma	Right ovary	Mass in lower abdomen with irregular cramps
12	Salmon	1932	Right	600 ccs 700 ccs	None	300 ccs	Fibromyoma uteri	Uterus	Menorrhagia for two years
13	M.G.H.	1934	Right	Repeated	1	Large amount	Fibroma	Left ovary	Dyspnea Change in bowel habits
14	Miller	1936	Not Reported	3	None	Not reported	Fibroma	Right	Pressure Weakness Disability
15	Weld	1936	Right	None	None	3500 ccs	Fibroma	Bilateral	Swelling of abdomen
16	Weld	1936	Right	None	None	Some	Fibroma	Right	Abdominal enlargement
17	Macomber	1937	Right	1	1	2 qts	Fibroma	Left	Abdominal tumor Dyspnea
18	Rhoads and Terrell	1937	Right	Repeated	None	750 ccs	Fibroma	Right ovary	Dyspnea
19	Bomze and Kirschbaum	1937	Left	None	None	Some	Fibroma	Left ovary	Lower abdominal mass Slight dyspnea Bearing down sensation Edematous feet and ankles

Case No	Author	Year	Site of pleural Effusion	No of Thoracenteses and Amount	Preoperative Paracenteses	Operative Abdominal Effusion	Type of Tumor	Location of Tumor	Chief Complaint
20	Schenk and Els	1937	Right	1000 ccs	None	Not reported	Papillary adeno-carcinoma	Left ovary	Heartburn with dull epigastric pain
21	Harris and Meyer	1938	Right	3000 ccs	None	200 ccs	Fibroma	Left ovary	Dyspnea Pain in right chest
22	Borg	1939	Bilateral	2	1	Moderate amount of ascites at autopsy	Fibroma	Both ovaries	Abdominal pain Dyspnea
23	Henderson	1939	Right	4	None	Large amount	Fibroma	Both ovaries	Pain in right chest Breathlessness
24	Lock and Collins	1940	Right	None	None	4 liters	Fibroma	Left ovary	Abdominal pain Distention Mass
25	MacFee	1941	Right	5 times in thirty days	None	Small amount	Cyst-adenoma	Left ovary	Swelling of abdomen Dyspnea
26	Jones	1941	Left	None	None	9 qts	Fibroma	Left ovary	Loss of weight Dyspnea Abdominal tumor
27	Glass and Goldsmith	1941	Right	1	None	400 ccs	Fibroma	Right ovary	Shortness of breath Abdominal distention
28	Melgs	1941	Right	4	1	500 ccs	Fibroma	Left ovary	Pleurisy Backache Asthma. Dyspnea

29	Melgs	1941	Right	3	None	500 ccs	Fibroma	Left ovary	Cough Dyspnea
30	Ritvo	1941	Right	2	None	2 qts	Fibroma	Right ovary	Lower abdominal pressure Prolapse
31	Kelman	1942	Right	Large amount	None	5500 ccs	Brenner		Cough Dyspnea
32	Herrlek, Tyson and Watson	1942	Right	11 times 1000 ccs each time	None	200-300 ccs	Fibroma	Both ovaries	Increasing dyspnea
33	Clay, Johnston and Samson	1944	Right	5 pts	None	Small amount	Fibroma	Left ovary	Breathlessness with abdominal mass
34	Clay, Johnston and Samson	1944	Right	Repeated Total of 35 pts	None	400 ccs	Fibroma	Right ovary	Breathlessness
35	Mendel and Tyrone	1944	Right	None	None	4000 ccs	Thecoma		Abdominal distention Slight dyspnea
36	Gardiner and Lloyd-Hart	1944	Right	Large amount	None	Some	Fibromyoma	Left ovary	Dyspnea
37	Millett and Shell	1945	Right	900 ccs 900 ccs 1950 ccs 700 ccs	None	Moderate amount	Multilocular pseudo-mucinous cystadenoma		Dyspnea
38	Davison and Nora	1945	Right	6 times 2 liters each time	None		Multilocular pseudo-mucinous cystadenoma	Right ovary	Anorexia Upper abdominal pressure Swollen leg

Case	Age	Status	No of Children	End Result	Follow-Up	Pleural Fluid Cultures	Guinea Pig Inoculation	Wassermann
1	36	Married	Yes	Death		Not reported	Not reported	Not reported
2	36	Single	*	Good	Not reported	Not reported	Negative	Not reported
3	42	Single	No	Good	15 months	Sterile	Negative	Not reported
4	55	Married	Yes	Good	11 years	Not reported	Not reported	Not reported
5	38	Married	2	Good	27 years	Sterile	Negative	Not reported
6	36	Married	1	Good	3 years	Not reported	Not reported	Not reported
7	53	Married	No	Good	7 months	Sterile	Negative	Not reported
8	64	*	*	Good	3 months	Sterile	Negative	Not reported
9	58	Married	Yes	Good	Not reported	Sterile	Negative	Not reported
10	37	Married	S.B	Death		Not reported	Not reported	Not reported
11	52	Married	*	Good	24 months	Sterile	Negative	Negative
12	47	Married	S.B	Good	17 months	Sterile	Negative	Negative
13	52	Single	No	Good	16 months	Sterile	Negative	Not reported
14	60	Single	No	Good	Not reported	Not reported	Not reported	Not reported
15	55	*	*	Good	3 months	Not reported	Not reported	2 plus
16	50	Married	*	Good	7 months	Not reported	Not reported	Not reported
17	33	Single	No	*	Not reported	Not reported	Not reported	Not reported
18	57	Married	3	Good	7 weeks	Sterile	Negative	Not reported
19	45	Married	*	Good	16 months	Not reported	Not reported	Not reported





Neither does there seem to be any connection between the location of the tumor and the side of the hydrothorax. All combinations are present, such as Right ovarian tumor with left hydrothorax, left ovarian tumor with right hydrothorax, bilateral tumors with right, left, and bilateral hydrothorax.

Up to the present time, no cause for the syndrome has been agreed upon. It has been suggested that there may be a lack of right lung drainage by the Azygos vein. Inasmuch as a left hydrothorax has been found, this hypothesis does not seem plausible. At the necropsy of Case No. 22 very large Azygos veins were found.

Selye,<sup>31</sup> who used data obtained from experimental work on animals, stated that repeated minor trauma to the peritoneum by the tumor causes a resistance of the tissue which later returns to normal, however, after a long period of continued trauma, the resistance disappears, and a histamine toxicosis or anaphylactic shock appears with accumulation of peritoneal and pleural transudates. This reaction can neither be considered proved nor contradicted.

Meigs'<sup>32</sup> study of two cases showed that the hydrothorax and ascites were almost identical in protein composition and established some form of communication between the two by showing that particulate carbon, after being injected into the abdomen, almost immediately appeared in the pleural fluid but not in the blood stream.

### SUMMARY

1 The second case of Meig's Syndrome due to pseudomucinous cystadenoma of the ovary is presented.

2 The case was presented to make people more conscious of a condition that responds very well to a simple operation or second operation as in this case.

3 The literature is reviewed, brought up-to-date, with the addition of the leg portion of the syndrome.

4 The fact that the fluid in the peritoneal cavity differed from that in the thoracic cavity would mean that the cells found in the peritoneum did not get beyond the diaphragmatic barriers.

### RESUMEN

1 Se presenta el segundo caso del Síndrome de Meig causado por un cistoadenoma pseudomucinoso del ovario.

2 Se ha presentado este caso con el objeto de llamar la atención de los médicos hacia un estado que responde satisfactoriamente a una operación sencilla, o a una segunda operación, como este caso.

3 Se revisa la literatura y se la pone al día con la adición de la parte del síndrome referible a la pierna

4 El hecho de que el líquido en la cavidad peritoneal fue diferente al que se halló en la cavidad torácica parece indicar que las células que se encontraron en el peritoneo no penetraron más allá de la barrera diafragmática

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# Thymectomy in the Treatment of Myasthenia Gravis\*

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Myasthenia gravis was almost always a fatal disease before treatment with prostigmine was introduced.<sup>1</sup> Although this drug and certain other palliative remedies have been most helpful in controlling symptoms and prolonging life, search for curative treatment has continued. In recent years thymectomy has offered hope of surgical arrest or alleviation.

Attention was directed to the thymus because thymoma is known to occur in a substantial percentage of cases of myasthenia gravis. In certain additional cases hyperplasia of the thymus also has been noted. Removal of a thymus tumor or an enlarged thymus or even removal of an apparently normal thymus has been followed by clinical improvement. The results of operation have not been uniform, and for this reason it is desirable to present complete information regarding cases in which surgical treatment has been attempted.

## INCIDENCE OF THYMUS PATHOLOGY

In autopsies on patients dying from myasthenia gravis, thymic abnormalities have been found in 47 per cent by Miller<sup>2</sup> and in 45 per cent by Campbell, Fradkin and Lipetz.<sup>3</sup> In a high percentage, the abnormality has been classified as thymoma. In cases reviewed by Gillespie<sup>4</sup> the incidence of tumor was 50 per cent. Almost all patients with a thymoma eventually develop myasthenia gravis,<sup>5</sup> but the tumor may be present for some time before myasthenia appears. One of our patients had been known to have a tumor in the upper mediastinum, later proven elsewhere to be a thymus tumor, for more than a year before he presented symptoms. We have removed a thymoma in the case of a 20 year old male who had never had symptoms of myasthenia gravis.

With rare exceptions, tumors of the thymus associated with myasthenia gravis have been benign.<sup>3</sup> In one case, reported by Turnbull,<sup>6</sup> a malignant thymoma was removed, there was no relief from the myasthenia gravis. Meggendorfer, quoted by Miller,<sup>2</sup>

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found one malignant tumor among 60 cases of thymoma in a review made in 1908 of cases then on record with thymoma and myasthenia gravis

In a total of 32 thymectomies for myasthenia gravis, Clagett<sup>7</sup> found a thymoma in 15 cases and hyperplasia of the thymus in 17 cases

Minor changes in the thymus have been found not only in cases with myasthenia gravis but also in cases of primary hyperthyroidism, Addison's disease and acromegaly, according to Sloan<sup>8</sup> In his study of 350 thymus glands removed at autopsy and those removed at operation, he did not find changes that were specific for myasthenia gravis

### RESULTS OF SURGICAL TREATMENT

For the reasons stated above, the thymus gland has for a great many years been suspected of at least partial responsibility in the causation of many cases of myasthenia gravis As early as 1908, Sauerbruch, and later, von Haberer, attempted the removal of a thymic tumor These early efforts ended in failure The first report of successful removal of a thymic tumor with a favorable effect upon the course of the associated myasthenia gravis was made by Blalock, Mason, Morgan and Riven<sup>9</sup> (1939) This tumor was a necrotic mass, no active tumor cells were found, even though there was active myasthenia gravis Pathologically, it was thought to represent the remains of a necrotic thymic tumor The patient showed apparent recovery from the myasthenia gravis at the time Blalock<sup>10</sup> recently reported that death occurred from recurrence after a survival of five and one-half years

The dramatic improvement in this tumor case led Blalock, Harvey, Ford and Lillenthal<sup>11</sup> (1941), to propose and try the effect of thymectomy in 6 cases of myasthenia gravis without demonstrable tumor The early results as given in this preliminary report were sufficiently encouraging to warrant application in other cases both by the authors and by other surgeons in this country and throughout the world In the first 20 cases Blalock<sup>12</sup> reported, there were 3 early postoperative deaths, 1 later death, 3 patients essentially well, 5 considerably improved, 5 moderately improved, and 3 unimproved All 16 surviving patients expressed the opinion that the operation had been helpful Hardymon and Bradshaw<sup>13</sup> reported 3 cases of thymectomy with improvement in 1 and no improvement in 2 Viets<sup>14</sup> reported the results in 15 cases from the myasthenia gravis clinic of the Massachusetts General Hospital Two patients were considered in complete remission, 2 more as distinctly improved, 3 as moderately improved, 1 as slightly improved, and 3 as having been operated upon too

recently to be evaluated Clagett<sup>7</sup> reported 17 thymectomies for myasthenia gravis without the presence of tumor in which there was 1 hospital death and 2 later deaths, 2 patients were considerably improved, 6 were moderately improved, and in 6 the operation was thought to have been of little help. He also reported 15 thymectomies for myasthenia gravis with associated tumor in which there was a remission in 3 cases and considerable improvement in 6 cases. Keynes<sup>5</sup> reported upon 51 cases of thymectomy for myasthenia gravis. He did not classify 10 because of mental abnormalities in 1 and operation too recently done in 9. Of the 41 that could be classified, there was a postoperative death in 8, 9 patients were considered as well, 11 as greatly improved, 8 as somewhat improved, and 5 were no better. Our own 8 cases we have classified as follows: considerably improved 2, moderately improved, 4, slightly improved, 1, and dead, 1. In a total of 129 cases reported by Blalock,<sup>12</sup> Bradshaw,<sup>13</sup> Clagett,<sup>7</sup> Keynes,<sup>15</sup> Viets<sup>14</sup> and ourselves, the results are: essentially well, 17, considerably improved, 24, moderately improved, 27, and slightly improved, 2. The others are unimproved, unclassified or dead. It would thus appear that 68 of these 129 cases, or 52 per cent, may be regarded as significantly better after the operation.

### INDICATIONS FOR THYMECTOMY

It should not be necessary to point out the need for accurate diagnosis of myasthenia gravis before any consideration of surgical treatment. As a rule, the diagnosis can be made easily but in the past, cases for which the surgical treatment might now be advised have been overlooked. The disability has been wrongly attributed to some serious neurologic disorder considered incurable, without even trial of medicinal therapy. This error should not be made by anyone who is familiar with the nature of the muscular weakness in myasthenia gravis. There are three features which serve to identify it.<sup>16</sup> It is selective, it is visible and it is variable. It almost always begins in the muscles controlling the movements of the eyeballs and the muscles concerned with speech, swallowing and mastication, general muscular weakness later develops as the disorder progresses. The change in muscular function can readily be seen in ptosis of the eye lids, strabismus or obvious weakness in the muscles of the face, mouth and tongue. It tends to appear with repeated effort and to decrease or disappear with rest. When the condition is suspected, the diagnosis can be confirmed by observation of the effect of injection of prostigmine.<sup>17</sup> There is almost immediate relief, lasting for two hours or more. A further test consists in the intra-arterial injection of prostigmine, which produces muscular fibrillation in the normal indi-

vidual but simply increases strength in the myasthenic patient

In the mildest cases it may be difficult to recognize the disorder if the patient is seen at a time when he is rested and thus free from obvious weakness. In such cases, the curare test has been recommended.<sup>18</sup> The administration of a test dose of curare will cause the weakness to appear, it is then abolished by administration of prostigmine. Such a test does not have any bearing on the group of cases of interest to the surgeon, since operation would not be warranted in cases of such mild degree.

After the diagnosis of myasthenia gravis has been established, medicinal treatment should always be carried on for a trial period of at least six months. The medication used consists of ephedrine, 25 mg, twice daily, and prostigmine, administered in 15 mg tablets, numbering 2 to 24 a day as needed to secure results. Some patients find that the use of potassium chloride gives added relief, but the majority do not feel that the benefit is great enough or certain enough to continue treatment with the large doses required to insure appreciable action. The 12 to 18 tablets of potassium chloride added to the 2 capsules of ephedrine and one or two dozen prostigmine tablets will seem beyond their capacity. Guanidine is a fourth remedy which has proved helpful in certain cases, but because of the relatively slight and uncertain benefit, and the frequency of toxic effects, we have seldom continued to use it for a prolonged period.

The course of myasthenia gravis varies greatly in different cases. Some patients are completely relieved of symptoms and are able to carry on their work and normal activity with medication. In a few cases spontaneous remission has occurred in the course of time, permitting omission of treatment. Other patients, while relieved in part, have continued trouble with the typical symptoms for at least part of each day. These are the cases in which the possibility of further help from surgery is sought. Continued disability after six months' trial of reasonably intensive medicinal treatment is the essential situation in which surgical treatment should be considered.

### SELECTION OF CASES

Thymectomy is a surgical procedure of considerable magnitude and the very nature of the illness makes operation of any kind on patients with myasthenia gravis unusually hazardous. In the critically ill patients with respiratory failure impending, operation could not be done without almost certain fatal outcome. In such cases, operation should not be attempted, one should defer radical treatment in the hope that intensive medicinal treatment will bring the patient through the crisis and permit the operation to

be undertaken at a later time under more favorable circumstances

The cases with myasthenia gravis of mild degree should be excluded from the surgical group also. These are the cases in which rehabilitation by simple medication is effective and to undertake operation with its hazards would not be warranted.

The age of the patient is an important factor. The risk of operation must be considered greatly increased after middle age. It is probably undesirable to operate on any patient older than 35 or 40. Empirically, in estimating the operative risk, a myasthenic patient should be considered as approximately twice the actual age in years.

### REPORT OF CASES

The cases are reported in the order in which operation was performed. A preliminary report on the first 3 cases has previously been published.<sup>19</sup>

*Case 1* A woman, aged 24 years, entered the Clinic on April 4, 1941, with a history of increasing difficulty in talking and swallowing of one year's duration. A test dose of prostigmine relieved the symptoms and a diagnosis of myasthenia gravis was established. She was treated with prostigmine bromide and ephedrine sulfate, with limited benefit. In time she became progressively worse and after five months the prostigmine needed had increased to 180 mg, supplemented by 50 mg of ephedrine daily. Even on this dosage, she had difficulty in eating. She was weak and was unable to do any work.

The patient was admitted to the hospital on November 23, and kept under observation for five days. During this period, numerous laboratory tests were done which yielded no data of additional significance, as was true also of the other cases in this series. Roentgenologic examination of the chest had revealed no enlargement of the mediastinal shadow to indicate thymic tumor. Neither has there been roentgenologic evidence of thymic enlargement in any of the other cases. Prostigmine was injected into the right brachial artery as a diagnostic test and the strength of the right hand was much improved. Four hours after a dose of prostigmine, its effect having worn off, fluoroscopy with barium in the pharynx showed her unable to swallow and some of the barium suspension entered the trachea.

Thymectomy was performed on November 28, 1941, through an anterior mediastinotomy incision under intratracheal anesthesia. The operative procedure described for this case is the same as that used in the other cases. An incision was made longitudinally from the isthmus of the thyroid downward over the mid sternum and then laterally to the sternal margin. The suprasternal notch was entered and a forefinger passed beneath the sternum. The sternum was split longitudinally in the midline from the suprasternal notch down to the third intercostal space by use of the Lebsche sternum knife and then carried laterally to the sternal margin. A self-retaining retractor was placed to hold the two margins of the split sternum apart. By dissection, the mediastinal pleura of each hemithorax was displaced laterally, thus exposing the intrathoracic portion of the thymus gland. The gland was also exposed

in the neck up to the inferior thyroid artery. In this case it measured 8 by 1 by 0.5 cm. and two lobes were clearly recognizable. Each lobe was removed separately by dissecting it away from the innominate vein, the pericardium and pulmonary artery upon which it lay posteriorly, and the pleura with which it was immediately in contact laterally. The scattered small vessels entering the thymus gland from the mediastinum were divided separately and ligated with fine silk. The neck and anterior mediastinum were searched for any aberrant thymic tissue, but none was found. The wound was closed without drainage. Pathologically, the thymus gland showed no abnormality.

After the operation, prostigmine bromide was given as necessary, about 180 mg. being used the first day, 120 mg. the second day and 90 mg. the third day. Thereafter, the need for prostigmine almost disappeared, after the fourth day she was given only 15 to 30 mg. daily. There was no question about her improvement in swallowing and speech, absence of ptosis and recovery of general strength in spite of reduction of the prostigmine intake. She was discharged on December 16, eighteen days after operation.

This patient has now been followed for four and a half years. The improvement continued for six months, with sporadic need for prostigmine, never amounting to more than 15 mg. in one day. For the following year with no treatment she was, so far as could be determined, in perfect health. She was able to work and enjoy life normally from July 8, 1942, until October 1, 1943. Then the tendency to have trouble with thick speech and drooping of the eyelids slowly returned, necessitating resumption of treatment. From October 1, 1943, to January 1, 1944, she required from 15 to 45 mg. of prostigmine and 25 mg. of ephedrine sulfate, but was able to continue her work. In early 1945 she required no treatment for six months. Later on it was necessary for her to take between 15 and 45 mg. of prostigmine for periods of a few days. In September 1945 she had a partial relapse which began about the time that she was married. Since then she has required from 15 to 60 mg. of prostigmine daily and 25 mg. of ephedrine sulfate. On this medication her symptoms have been entirely controlled and she has been able to do her own housework.

During periods of aggravation of symptoms, both before and since the operation, this patient has complained of a queer sensation of dizziness premenstrually. There has sometimes seemed to be an increase in her myasthenic symptoms premenstrually. We have classified this patient as considerably improved.

**Case 2** A girl of 14 years was first seen at the Clinic on January 27, 1942. She developed symptoms of myasthenia gravis shortly after the onset of menses at the age of 12. In the ten months preceding admission, the symptoms had become much worse. The voice tired easily, faded quickly and was nasal in character. She was unable to chew food for more than a brief period because of fatigue in the jaw muscles. While drinking she had to hold the lower jaw up with her hand to keep fluid from spilling out. She complained of thick, ropy mucus being present in the throat. She had diplopia as well as ptosis of the eyelids. The extremities became fatigued very easily. She had lost weight from 118 to 105 lbs. in the four months preceding her examination. A test dose of prostigmine relieved her symptoms.

Although myasthenia gravis is not common with onset at this early



age, the diagnosis was well founded. By trial it was found that 90 mg of prostigmine bromide and 50 mg of ephedrine sulfate a day were required to keep her reasonably free from symptoms. Roentgenograms of the chest showed no enlargement of the mediastinal shadows.

An anterior mediastinotomy and thymectomy were performed on March 16, 1942. Two lobes of thymic tissue weighing 18.2 gm and measuring 13 by 6 by 12 cm were removed. The pathologic diagnosis was hyperplastic thymus. The wound was closed without drainage and she left the operating room in good condition. For the first twenty-four hours after operation her course was entirely uneventful and she showed almost no evidence of having had the procedure. She was given 90 mg of prostigmine bromide and 50 mg of ephedrine on the basis of her preoperative requirements. Twenty-four hours after operation acute myasthenia, with frothy mucus filling the throat and trachea, suddenly developed. Tracheal aspiration and intravenous prostigmine restored the equilibrium within a half hour, but thereafter constantly increasing doses of prostigmine were required. Forty-eight hours after operation roentgenograms revealed widening of the mediastinum and patchy areas of density throughout the left upper lung field. Mediastinal aspiration yielded 150 cc of serosanguineous fluid and she was temporarily improved. Seventy-two hours after operation there was almost no effect from the prostigmine bromide and ephedrine sulfate, even intravenously, in doses as high as 1 cc of 1 to 200 solution hourly. Epinephrine was noticeably effective but the beneficial response lasted only a few minutes after each of the several times that it was administered. There were terminal signs of cardiac tamponade and she died eighty hours postoperatively.

The striking sign at necropsy was dryness approaching dehydration of the body tissues except for the region of the thorax. The muscles of the chest wall, neck and diaphragm appeared edematous. There was bilateral pleural and pericardial effusion and hemorrhage into the superior mediastinum. It is probable that the mediastinal effusion was instrumental in causing the edema and postoperative relapse of this patient. It was then decided that the wound would be drained postoperatively in subsequent cases. Also, in reviewing the case, it seemed that a respirator if used from the beginning of her untoward reactions might possibly have been helpful. With the aid of a respirator a patient who is refractory to prostigmine might be kept alive until the crisis of failure of respiratory muscles has passed. Consequently, a respirator has been kept at hand for use if needed in all subsequent cases.

**Case 3** A girl of 20, first seen at the Clinic on October 29, 1940, because of menstrual irregularity, developed diplopia in August 1942 while under observation and treatment for functional oligomenorrhea. Other symptoms of myasthenia gravis appeared and the condition progressed rapidly. The treatment finally included 360 mg of prostigmine bromide, 25 mg of ephedrine sulfate and 12 mg of potassium chloride daily as maintenance dosage. Even with this amount of therapy she was unable to do any work. She frequently required assistance in dressing and in the early morning usually had to use both hands to hold a drinking glass.

Anterior mediastinotomy and thymectomy were done on May 27, 1943. Two thymic lobes which seemed hyperplastic were removed. The thymus tissue removed measured 6 by 6 by 1 cm and the pathologic diagnosis was hyperplasia of the thymus. The mediastinum was drained by a

cigaret wick wrapped around an urethral catheter. The catheter was drawn out of the wound just above the suprasternal notch while the gauze of the wick was left entirely beneath the skin, but a silk thread anchored to the gauze was brought out alongside the catheter. The skin was closed snugly about the silk thread and catheter and the catheter was placed on 15 cm suction measured in water.

The postoperative course was not remarkable for the first week. The need for prostigmine dropped to 30 mg daily by the third day. The mediastinal catheter and wick were removed on the sixth day. The dosage of prostigmine remained at 15 to 30 mg until the fifteenth day, when she contracted a mild upper respiratory infection, and the prostigmine requirement promptly increased to 90 mg a day. In the next month she had to be given 210 mg of prostigmine, 50 mg of ephedrine sulfate and 1.2 gm of potassium sulfate. Thereafter there was a slow, gradual decline in the requirement. In October 1943, on 90 mg of prostigmine a day, she was able to play four sets of tennis or nine holes of golf with enjoyment, she was working full time. It is now three years since her operation. There has been a steady and gradual decrease in her need for medication. She takes from 15 to 30 mg of prostigmine daily and rarely has any evidence of myasthenia gravis.

Although this is certainly less than a perfect result so far as cure of myasthenia gravis by thymectomy is concerned, the overall improvement which began promptly with her thymectomy has continued gradually to date, and has been impressive and gratifying. Other clinicians have observed this type of gradual improvement beginning a few months after thymectomy. We as well as others have gained the impression that it is the patients with myasthenia gravis of shorter duration who are more likely to show sustained improvement following the operation. We have classified this patient as considerably improved.

**Case 4** A 49 year old woman was first seen at the Clinic on December 13, 1944. She suffered from severe primary hyperthyroidism and mild myasthenia gravis. The symptoms of both diseases began concurrently in April 1944, eight months prior to admission. The basal metabolic rate was +63, with pulse of 120. A test dose of prostigmine relieved her diplopia and ptosis. Sixty milligrams of prostigmine were required daily to control her myasthenia gravis, the principal symptoms of which were ptosis of the eyelids and diplopia. The general weakness could be attributed in part to the hyperthyroidism.

The patient was prepared for thyroidectomy with thiouracil and her metabolic rate reduced to +12. Her weakness partially disappeared as the thyrotoxicity was controlled. The thiouracil was administered for sixty-two days and iodine for twenty days prior to hospitalization for operation. The prostigmine requirement was not affected by these drugs given for the thyroid disorder.

A subtotal thyroidectomy was done on March 6, 1945. Through the same low cervical, collar-type incision, as much of the thymus as could be reached through the neck incision was removed from beneath the manubrium. Probably approximately the upper half of the thymus was removed. Both lobes were normal in appearance and showed no evidence of pathologic change.

Since operation she has had the usual relief from thyrotoxic symptoms. She still has evidence of myasthenia manifested by slight drooping

of one eyelid, which is more noticeable when she is attending church or visiting friends. Slight weakness of the voice develops when she talks a lot. She no longer has diplopia or general muscular weakness. She takes 15 mg of prostigmine occasionally just before going to church or to some social function, but never more than 15 mg a day.

Certainly, this was an inadequate thymectomy, but the patient's age, the mildness of the myasthenia gravis, the principal disease of primary hyperthyroidism and her general condition all made thymectomy through a mediastinotomy incision seem inadvisable. There are a number of reports<sup>20 21 22 23</sup> concerning the concurrence of these two diseases, with contrasting opinions as to whether myasthenia gravis is benefited or made worse by hyperthyroidism. It is our opinion that the benefit in this patient in respect to the myasthenia gravis is more probably related to relief of her hyperthyroidism than to the thymectomy as at least half of the thymus gland is known to remain in situ. We have classified this patient as moderately improved.

*Case 5* A woman of 29 years was first seen at the Clinic on February 29, 1940, with complaints of five years' duration which were typical of myasthenia gravis. She was treated medically for the succeeding five years with gradually increasing doses of prostigmine bromide, later supplemented by ephedrine sulfate. On a dosage of 120 mg of prostigmine and 25 mg of ephedrine sulfate she was getting along fairly well but was handicapped because of weakness in her hands which made it impossible for her to operate office machines. She had much difficulty with her speech and wanted to attain a better career than her disease would allow.

She requested thymectomy, which was performed through an anterior mediastinotomy incision on May 17, 1945. The thymus measured 12.5 by 1 by 0.5 cm. The pathologic diagnosis was thymic hyperplasia. She had an uneventful convalescence for forty-eight hours and then fairly abruptly developed dyspnea. A chest tap was done and 150 cc of serous fluid removed from the right upper pleural cavity. The dyspnea temporarily improved but soon recurred, accompanied by coughing with frothy sputum. She developed tension pneumothorax on the right side which was probably the result of an unrecognized injury to the lung by the aspirating needle at the time of the thoracocentesis. The pneumothorax was treated by constant suction and the lung thus kept expanded. On the fourth postoperative day her prostigmine need rose to 180 mg a day and it was difficult to keep her oxygenated even in a tent. At the end of 108 hours she became markedly worse, with such weakness of the muscles of respiration that respiratory exchange was inadequate. Oxygen from a tent was supplemented with nasal oxygen and she was placed in a respirator. From this critical low point in her postoperative course there was gradual and steady improvement, and on the seventh postoperative day all prostigmine and ephedrine sulfate could be omitted. She was removed from the respirator and oxygen therapy was discontinued on the sixth postoperative day. She took no further prostigmine and felt no need for it. This was in sharp contrast to her preoperative course when she felt urgent need for prostigmine at frequent intervals, and unless she received it, had difficulty in talking and swallowing. She was discharged on June 3, 1945.

The patient returned to work August 23, and when seen on September

5, had taken no prostigmine since leaving the hospital. She was working full time, she frequently went dancing in the evening and stated that she enjoyed the more vigorous types of dancing. Even fast walking had been impossible for her preoperatively. We noticed on examination, however, that her speech was thick and guttural after she had been kept talking for several minutes steadily. The eyelids did not droop but on the other hand, did not close well. It was suspected that she still had myasthenia gravis, although then in a latent form. This suspicion was confirmed on December 5, when she had a mild partial relapse. Since that time she has required prostigmine in variable doses from 60 to 105 mg. If she takes more she has abdominal cramps. Preoperatively she never had abdominal cramps even when she had taken over 400 mg. in twenty-four hours on a few occasions. On this amount of medication she is working full time and feels well, with full control of symptoms.

This case illustrates vividly the severity of illness and danger to life which any complications postoperatively present in myasthenia gravis. The thymectomy itself is neither very difficult nor particularly dangerous, but there is high risk that a complication which would be mild in a normal individual might endanger life in a patient with myasthenia gravis. We have classified this patient as moderately improved.

**Case 6** A girl of 21 was first seen at the Clinic on January 17, 1945, with a history of progressive weakness and fatigability of nine years' duration. She had been treated for myasthenia gravis with prostigmine, but with a dosage of 105 mg. given daily she was unable to do any work and could scarcely hold her eyes open. The diagnosis of myasthenia gravis was readily confirmed and the dosage of prostigmine was increased. Nine months later she was taking 225 mg. of prostigmine supplemented with 50 mg. of ephedrine sulfate daily but still had inadequate symptomatic relief.

Thymectomy was advised and performed through an anterior mediastinotomy incision on October 23, 1945. The thymus was not abnormal grossly or microscopically. It measured 8 by 2 by 1.5 cm. The prostigmine need dropped precipitously from 225 mg. to 30 mg. daily on the fourth postoperative day and disappeared on the eighth day. She was discharged November 4, the twelfth postoperative day.

After an additional week without any prostigmine, she was obliged to resume treatment on November 11. When seen on December 11, 1945, she was taking 45 mg. of prostigmine daily. She felt stronger than preoperatively, even with 225 mg. She showed weakness of the facial muscles and increase of the dosage to 75 mg. daily was advised. She was last seen May 21, 1946, and obviously still had myasthenia gravis. On 75 mg. of prostigmine she had noticeably better facial expression and could smile more easily than preoperatively. Also she had resumed singing in her church choir which she had been forced to give up before operation. There was definite weakness of the leg muscles after climbing a flight of stairs. She has always had the most trouble with myasthenia gravis for the week before and the first three days of her menstrual period. She has then improved to the point of feeling best between the twelfth and seventeenth days after onset. In contrast to the preoperative status her voice was clear, there was no salivation and the eyes did not droop.

We are pessimistic about the prospects of remission in this case with the amount of myasthenia gravis in evidence seven months after operation. Also, the disease has been present for nine years. There have been no irreversible changes demonstrated in this disease but we have gained the impression that patients with a long history prior to operation are less likely to obtain sustained and marked benefit from thymectomy. We suspect that much of her apparent subjective improvement may be explained on a psychologic basis. This latter factor unquestionably is of importance in the responses of these patients. We have classified this patient as only slightly improved.

*Case 7* A woman of 31 years was first seen at the Clinic on June 13, 1944, with a history of myasthenia gravis of four years' duration. She had received no previous treatment. The symptoms had begun as slight impairment of speech and blurring of vision and had been only slowly progressive. After establishment of the diagnosis she was started on the usual medication. It was found that 90 to 150 mg of prostigmine and 50 mg of ephedrine sulfate daily were required. The patient and her husband desired that operation be done in the hope of obtaining relief from the disease.

Thymectomy was performed through an anterior mediastinotomy incision on January 11, 1946. Although there was no roentgenologic evidence of abnormality in the mediastinal shadow, both lobes of the thymus gland appeared enlarged and edematous. The gland measured 9 by 3 by 0.6 cm. There was no pathologic abnormality discovered. The postoperative convalescence was uneventful, but her prostigmine requirement did not drop on the fourth or fifth day as had been noticed in two of the previous cases. There was a gradual reduction from 120 mg preoperatively to 60 mg at the end of the postoperative period. She was discharged on January 30, the nineteenth postoperative day.

This patient wrote us on April 28, 1946. She was doing her own housework and leading a socially active life. She believes herself to be greatly improved, but she still requires 45 to 60 mg of prostigmine daily. We have classified this patient as moderately improved.

*Case 8* A woman of 32 years was first seen at the Clinic on November 8, 1943, with a history of drooping of the eyelids of eleven months' duration. There had been no previous treatment. The prostigmine test was positive. A test dose of prostigmine relieved her symptoms. By trial she was found to need 45 mg of prostigmine and 25 mg of ephedrine sulfate daily. In the next two years there was a gradual deterioration in her condition. The prostigmine had to be increased to 135 mg and ephedrine sulfate to 50 mg daily, but even so she continued to have marked weakness in her hands and knees, as well as salivation, gagging, diplopia and ptosis. She felt that she would like to have thymectomy performed even though she understood the risk involved and that the effectiveness of the operation could not be predicted.

Thymectomy was performed through an anterior mediastinotomy incision on March 26, 1946. The gland measured 6 by 1.5 by 0.5 cm and showed no pathologic abnormality. Postoperatively her prostigmine requirement dropped gradually but steadily and she was taking 30 mg daily at the time of her discharge on April 13, the sixteenth postoperative day. She was last seen on May 10, 1946. She was taking 45 mg of prostigmine daily without ephedrine. Her eyes drooped if she got very tired.

She felt that she is at least 50 per cent improved over her preoperative status. This estimate is approximately in accord with the reduction in prostigmine need, of which she was requiring 135 mg preoperatively. It is too early to predict whether the apparent improvement will be sustained. We have classified this patient as moderately improved.

### DISCUSSION

As may be seen from a reading of these case reports, the 7 patients living of the 8 operated upon have all experienced subjective and functional improvement. As a result of the operation, the progressive course of myasthenia gravis in 2 of the cases was dramatically reversed. The change may be attributed to the removal of the thymus. It could possibly be due to the anesthesia or to coincidental spontaneous remission. But it is important, also, to realize that they all still have myasthenia gravis. The estimate of the degree of improvement made by the patient in some cases exceeds that made by the physician, but from a practical standpoint the fact of improvement can be granted without argument. On this basis the operation has been, to a greater or lesser extent, successful (excluding, of course, the one fatal case). On the other hand, from the standpoint of complete and permanent cure of myasthenia gravis, it is apparent that thymectomy has failed in all cases. If one postulates that the mere presence of the thymus is responsible for myasthenia gravis in sensitized individuals and attributes improvement when such occurs after thymectomy to removal of the thymus, consistency in logic would imply that some thymic tissue remains in individuals who have shown persistent symptoms of myasthenia gravis after the operation. In each case, the thymus was entirely removed unless some part of it escaped our careful search of the mediastinum and neck or is represented by ectopic tissue elsewhere in the body. If the thymus is not responsible for the disease, at least in part, then one is at a loss to explain the improvement or remission that has occurred in a number of cases after its removal because rapid spontaneous remission has not followed with any such constancy after anesthesia or operations on patients with myasthenia gravis for other conditions.

The results of these 8 cases, in summary, have been classified as considerably improved, 2, moderately improved, 4, only slightly improved, 1, and dead three days postoperatively, 1.

### SUMMARY

Thymectomy has been undertaken in an effort to alter the unfavorable course of myasthenia gravis in selected cases.

The incidence of thymic abnormalities found in autopsies of patients dying of myasthenia gravis is approximately 50 per cent.

Aside from tumor, similar thymic abnormalities are found in other debilitating diseases. The incidence of myasthenia gravis in patients with benign thymoma is almost 100 per cent. Myasthenia gravis is very rare in association with malignant thymoma.

In our 8 cases there were 2 considerably improved, 4 moderately improved, 1 only slightly improved, and 1 death three days post-operatively. The results in 129 cases reported by six authors including our own cases, are 68 (52 per cent) classified as well, considerably or moderately improved after operation.

In view of the variation in the behavior of the disease and the lack of uniformity of results of thymectomy, operation is indicated only under the special circumstances which have been discussed.

### CONCLUSION

Thymectomy is believed to be indicated for certain patients with myasthenia gravis whose disease is severe and continues to be disabling when adequate medical therapy has been carried on for at least six months, provided the status of disease and general condition allow the procedure to be undertaken with a reasonable expectation of successful technical performance.

### RESUMEN

Se ha practicado la timectomía con la intención de alterar el curso desfavorable de la miastenia grave, en casos seleccionados.

La frecuencia de anomalías tímicas encontradas en las autopsias de pacientes muertos de miastenia grave es aproximadamente del 50 por ciento. Con la excepción de tumor, se encuentran anomalías tímicas semejantes en otras enfermedades debilitantes. La frecuencia de miastenia grave en pacientes con timoma benigno es casi del 100 por ciento. Es muy rara la miastenia grave asociada con el timoma maligno.

En nuestros 8 casos hubo 2 considerablemente mejorados, 4 moderadamente mejorados, 1 sólo ligeramente mejorado, y una muerte tres días después de la operación. Los resultados en 129 casos comunicados por seis autores, incluyendo nuestros propios casos, son 68 (52 por ciento) clasificados como curados, considerablemente mejorados o moderadamente mejorados, después de la operación.

En vista de la variación en el curso de la enfermedad y de la falta de uniformidad de los resultados de la timectomía, se indica la operación solamente en las circunstancias especiales que han sido discutidas.

### CONCLUSION

Se opina que está indicada la timectomía en ciertos pacientes con miastenia grave cuya enfermedad es severa y sigue produ-

ciendo incapacidad aún cuando se ha continuado la terapia médica adecuada por seis meses por lo menos, con tal de que el estado de la enfermedad y la condición general del paciente permitan que se practique el procedimiento con una expectativa razonable del buen éxito técnico

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## DISCUSSION

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I feel privileged to be asked to discuss this excellently prepared and presented paper, since my experience with this procedure has been limited to two cases. The first having a tumor of the thymus, died shortly following operation, and the second, having no pathological changes present in the gland, shows considerable improvement, with reduction in the amount of prostigmine necessary to relieve her symptoms.

As pointed out by Dr Adams, the role the thymus plays in the production of the symptoms found in myasthenia gravis is still clouded and indefinite. Some five or six years ago, Dr Blalock's pioneering work in elective thymectomy for those suffering from myasthenia gravis, with encouraging improvement, if not actual cure, led a number of other men to enlarge on this procedure. It is still too early for too much optimism, but the results both in this country and in Europe show marked and generally consistent improvement of symptoms in the majority of cases.

Among the most plausible of the theories as to the causation of the more or less complete muscular paralysis found in myasthenia gravis is that of the production in the body of some chemical or endocrine substance, perhaps by the thymus, affecting the myo-neural junction by a blockage similar to that produced by the drug curare. The fact that the removal of thymic tumors, cystic or diseased thymic glands, or even more or less normal persistent thymic glands in adults causes a reversal of these symptoms may be misleading. Perhaps this surgical invasion of a field, considered heretofore purely medical in aspect, may be but a stop-gap procedure of therapy, but it has stimulated increased interest and opened up numerous new angles of approach as to the causation of this disease.

It is interesting to note in all reports that, both prior and after thymectomy, in those female patients with myosthenia gravis, the symptoms were worse at the menstrual periods or in early pregnancy, but that there was a remission of these symptoms in later stages of pregnancy. I should like to ask Dr Adams if any recent experimental work has been done in an effort to extract a substance from the surgically removed specimens that has any influence on those suffering from myasthenia gravis, or on normal subjects?

The surgical approach for complete thymectomy as described need not be enlarged upon. To anyone who has attempted the

complete extirpation of the thymic tissue, the mid-line incision with sternal fissure in the only approach that offers complete and easy dissection under direct vision. The antero-lateral and postero-lateral, either extra-pleural or trans-pleural, leave much to be desired in exposure.

Dr Adams and his associates are to be complimented on their scientifically complete study of these patients both pre- and post-operatively, and on their surgical results in operating upon these gravely debilitated patients.

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# Anesthesia in Tracheo-Bronchial Procedures\*

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This paper does not attempt to advance anything new in the technic of bronchoscopy or bronchography, but we wish to report what we consider to be a safe and efficient anesthetic agent, which others have declared to be a dangerous drug. This substance is pontocaine (p-butyl-aminobenzoyl-dimethyl-amino-ethanol). After having had unfortunate experiences with other topical anesthetics, pontocaine was tried and the results were so satisfactory that it has been employed for topical anesthesia to the exclusion of other preparations.

Pontocaine has been used by us for topical anesthesia of the pharynx, larynx and trachea in bronchography and bronchoscopy. Our procedure consists in administering sodium pentobarbital grains one and one-half (0.1 Gm.) one-half hour prior to bronchography. Preceding bronchoscopy, sodium pentobarbital grains one and one-half (0.1 Gm.) is given one hour before the contemplated procedure and dilauid grains one thirty-second (0.002 Gm.) with scopolamine grains one two-hundred (0.00037 Gm.) one-half hour before. Anesthetization is the same in both instances. The pharynx is sprayed twice with pontocaine 2 per cent containing one drop of epinephrine 1-1000 to each cubic centimeter, using an average of 15 cc. For laryngeal and tracheal anesthesia, a one-half per cent solution of pontocaine also containing one drop of epinephrine 1-1000 to each cubic centimeter is instilled with a syringe and cannula in one cubic centimeter amounts at intervals of two or three minutes for four doses. This produces sufficient anesthesia to abolish the cough reflex for a long enough time to permit unhurried endobronchial procedures, but shortly afterwards the effect has worn off and the patient is able to clear his tracheobronchial tree of secretions, which is a decided advantage.

A review of the literature, we believe, will show why our results have been so favorable while others were not. Putney<sup>6</sup> employed pontocaine 1 per cent for topical anesthesia of the pharynx and larocaine (1-p-aminobenzoyl-2,2-dimethyl-3-diethylamino-propanol) 2 per cent for instillation into the trachea. He states "The anesthetic power of 1 per cent pontocaine corresponds to that produced by 10 per cent cocaine, while 2 per cent larocaine is

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equivalent to twice that strength of cocaine" We feel that a 20 per cent solution of cocaine would be a very dangerous anesthetic for this type of work Moorhead<sup>5</sup> found that close to one-half of his correspondents used 10 per cent cocaine by some method, the remainder being divided as to larocaine, pontocaine, and Forester's solution One observer wrote that "pontocaine has occasionally seemed toxic, but larocaine has never produced the slightest sign of toxicity, however, the pontocaine is not quite so effective as cocaine, the larocaine is definitely less effective" Jackson and McReynolds<sup>4</sup> objected to pontocaine because it would frequently precipitate an attack in asthmatic patients and because of its tendency to cause an irritation which may persist for several days In spite of this they used the drug extensively except in asthmatic patients

Criciani and Nogeura<sup>1</sup> were able to produce an asthmatic crisis in all of their asthmatic patients by the intratracheal instillation of pontocaine and found that the same substance produced no attack in normal persons They believed that this was due to the stimulation of the unstable vagosympathetic system which exists in asthmatics

Thomas and Fenton<sup>7</sup> reviewed the literature and reported eight instances in their experience of reactions to pontocaine In all of these, amounts from five to ten cubic centimeters of a 2 per cent solution were used They made patch tests with cocaine and pontocaine in a number of allergic individuals and found that less than one-half per cent gave positive reactions to cocaine, while over nine per cent demonstrated sensitiveness to pontocaine

Hansen and Stealy<sup>3</sup> reported sudden death following gargling with four cubic centimeters of 2 per cent pontocaine preceding gastroscopy Derbes and Engelhardt<sup>2</sup> reported five deaths following the use of either pontocaine or cocaine or both prior to bronchography In all of their cases except one, the amount of pontocaine used was over two cubic centimeters of the 2 per cent solution

We have used pontocaine for anesthesia in 496 bronchoscopies on 264 patients and in 103 bronchographies for the diagnosis and treatment of pulmonary tuberculosis, bronchiectasis, and bronchial asthma Except in two instances, no untoward effects were observed The first was a white male 27 years of age who had been diagnosed as bronchial asthma, but symptoms of bronchiectasis appeared Bronchography was performed without incident and did not reveal any evidence of bronchiectasis Two weeks later the patient requested that another instillation of the iodized oil be given because he had felt so much better following the bronchography This was attempted Anesthetization was uneventful,

but a few minutes after the instillation of the oil, the patient became cyanotic and respirations ceased. Following the administration of epinephrine and aminophyllin and oxygen, he was revived and later did not show any ill effects. Evidently this was due to either allergic shock to the iodized oil as reported by Mahon<sup>5</sup> or to the oil acting as an obstructing medium as Waldbott<sup>9</sup> believes.

The second instance was in a white male, age 53 years, who had arrested pulmonary tuberculosis. Symptoms of bronchiectasis caused him to be referred for bronchography. Following anesthetization, he developed wheezing, and in view of our previous experience, the iodized oil was not instilled. The wheezing subsided without any medication being necessary. Possibly this case was of the type described by Criciani and Nogueira.<sup>1</sup>

Patch tests with pontocaine 2 per cent were made on 20 patients (none of whom had had bronchoscopy or bronchography) without obtaining the slightest reaction, though all of these had been diagnosed as having bronchial asthma. This is not a reliable indication of sensitiveness since Derbes and Engelhardt<sup>2</sup> point out: "While patch tests to drugs causing contact dermatitis are highly specific and reliable, drugs which cause trouble following parenteral administration often can not be satisfactorily tested either by patch tests, scratch tests, or intracutaneous tests."

### CONCLUSIONS

We feel that the poor results previously reported have been due to using too large an amount of the drug. The manufacturer advises that not more than one cubic centimeter of the 2 per cent solution or equivalent amounts of other strengths be instilled intratracheally. In the reactions which have been observed, amounts far in excess of this have been used. While the total amount of pontocaine used by us exceeds the advocated quantity, we feel that the addition of epinephrine to the solutions as advocated by Fussganger and Schaumann<sup>2</sup> permits this. The epinephrine slows the rate of absorption of the drug and thereby allows detoxification to take place in the liver.

From our observations we believe that pontocaine is an excellent drug for anesthesia of the upper respiratory tree if it is used properly. Reactions will continue to be observed as long as overdosages of the drug are administered.

### CONCLUSIONES

Estamos convencidos de que los malos resultados anteriormente comunicados se han debido al empleo de una cantidad muy grande de la droga (pontocaína). El fabricante aconseja que no se instile

en la tráquea más de un centímetro cúbico de la solución al 2 por ciento, o de cantidades equivalentes de otras concentraciones. En las reacciones observadas las cantidades que se han empleado han sido muy en exceso de esas. Aunque la cantidad total de pontocaina usada por nosotros excede la cantidad aconsejada, opinamos que la adición de adrenalina a las soluciones, como lo recomiendan Fussganger y Schaumann,<sup>2</sup> lo permite. La adrenalina retarda la velocidad de absorción de la droga y de tal modo permite que la detoxificación tenga lugar en el hígado.

Basados en nuestras observaciones opinamos que la pontocaina es una droga excelente para anestesiar las vías respiratorias superiores, si se la usa correctamente. Se continuarán observando reacciones mientras se administren dosis excesivas de la droga.

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the time element in the development of tuberculosis infiltrations is of great importance since most of our observation begins at a variable period following the onset of the infiltration

In our 16,000 inmate patient population where contact with open cases of tuberculosis has been much more uniform than in the population in the state as a whole the institutional population shows an infection rate of over ninety per cent. At the present time we have 2784 cases who show some pulmonary changes on the roentgengram. There are approximately 500 cases that show pulmonary shadows which are due to conditions other than tuberculosis. This leaves a load of 2284 cases of tuberculous infection, 269 of whom are proven positive carriers of pathogenic acid-fast organisms. There are 290 cases in isolation with lesions that are considered active but who have not been proven bacteriologically positive at this time. The pulmonary shadows shown are usually located in the apical area. These shadows have remained stationary over a four year period with films taken from six to twelve month intervals. Bacteriological specimens taken at three to twelve month intervals have remained negative. It is important to note that these cases do not contribute to our isolation facilities. They add much, however, to the demands upon the laboratory and the time and services of the clinician. As found in our routine, they do not make a significant contribution to our institutional health problem. If they were ever open cases of tuberculosis, the infiltration as it now remains shows no evidence of activity.

There have been 326 members of the military forces of the late war hospitalized in Minnesota up to this time. While the induction films on these cases are not often available, it was possible to analyze ninety-seven cases on the basis of later breakdown. There was one whose induction film was negative who broke down in less than one month, one in less than three months, six in less than six months, thirteen in less than one year, and twenty-five who first developed evidence of tuberculosis after one year's time. There were fifty-one cases that showed evidence of parenchymal infiltration on induction films. Thirty-one of these definitely broke down within one year and twenty after one year. In a study of this group of cases, it seemed evident that the original infiltration developed rather quickly, the borders of the lesion, whether minimal or extensive, tending to remain stationary. Later extensions, as revealed by those coming into the service with an early infiltration established, indicated the extension from this early site to be due to factors other than those that determined the original spread. Living conditions, camp life, boot-training, and the usual activities of camp and field routine aided in the extension of the infiltration.

The finding of pulmonary shadows through surveys increases the clinical responsibility of the doctor in diagnosis and in determining activity of those cases identified on the roentgengram as being tuberculous. A small number of these cases have become progressive and so remained until death. It is important to determine the conditions and the duration of the infiltration as found in these cases. While our data are not sufficiently complete to reduce it to percentages, we feel that the rapid infiltrations reaching their peak within a short period of time are more common than otherwise, and it is our experience so far that, if we are to identify the case early, which is important in order to limit exposure to contacts and to initiate satisfactory therapy, the clinician must be brought in to evaluate symptoms and diagnose the case. The identification of cases in surveys depends largely on the roentgengram and must be based on repetition of the films at a much more frequent interval than is usually considered necessary. We are throwing a tremendous load on the roentgengram which in the end can only pass the work along to the clinician for final evaluation of the data and diagnosis of the condition. In relation to the uniformity of rapid infiltrations that reach a peak within a short period followed by a tendency to absorb or fibrose, this group may or may not have been identified early. Bacteriologically, they almost uniformly become negative and remain so for the duration of their observation. We do not find that this group of cases make any material contribution to our case load. Reactivation and breakdown are conditions which in our experience in state hospital work have not been frequently observed. In this group, twenty per cent of the cases identified by shadows have shown evidence of active disease, one half of this group have been proven bacteriologically positive over one year ago and have since been convalescing with negative gastric lavage, while the remaining cases continue to be positive up to the present time. During the past four years, the 1828 cases under observation with shadows on the roentgengram have shown no change and have remained bacteriologically negative.

#### SUMMARY

The establishment of the original tuberculosis infiltration following the primary infection has been discussed from the clinical and epidemiological point of view. The evaluation of old lesions relative to later changes in the infiltration has been reviewed in a group of cases that have been observed over a period of time from one to four years. The time during which the pattern of infiltration becomes set is discussed in relation to the current



tendency to confine case finding programs to x-ray surveys on an interval of one to five years

The large group of individuals showing shadows, usually apical, has been discussed in relationship to the total tuberculosis load requiring continued follow-up supervision. These cases, apparently minimal at the peak of development, have remained consistently negative for the period observed having had at least one series of one to four gastric lavage examinations per year. We do not find our positive cases or our reactivations among this group of patients, in fact, a very considerable number of active cases are not found to be associated with any older evidence of a tuberculosis infection other than a positive tuberculin test. The time element involved between the positive reactors and the onset of symptoms leading to progressive tuberculosis has not yet been determined. A positive tuberculin reaction is the first requirement in the development of clinical disease. There has been no apparent relationship between the recently developing tuberculin positive case and early breakdown with tuberculosis. The inactive cases shown by apical shadows at the present time represent over seventy-five per cent of the total number found on x-ray among our mentally ill. It would seem that this group which does not require therapy or isolation for control purposes must remain of historical interest only.

### CONCLUSIONS

The shift in diagnosis of diseases of the chest resulting from the prolongation of the period of longevity has brought many new problems into our field. The roentgenogram must remain an important element in the internist's inspection of the chest along with the tuberculin test, history of exposure, physical signs, and possibly the most neglected and most important, the further refinement in our bacteriological identification and later control of the open case of tuberculosis.

Because of the variability of shadows on the roentgenogram resulting from conditions developing through our changing periods of longevity, there has been created a clinical problem of evaluation of new shadows regardless of location as well as possible changes in old shadows. The interpretation of old lesions relative to changes in the infiltration can be of little value to us in our control program unless it be associated by the internist and bacteriologist with their clinical and bacteriological findings. Both the beginning and end of the identification and treatment of tuberculosis has become a challenge in the differential diagnosis to the family doctor and the internist.

The repetition of x-ray surveys is important for case finding

purposes in special groups. However, tuberculosis, as we see it, is largely limited to the family and the relatively small community group where dependence upon surveys would permit many cases to develop advance disease waiting for a routine survey to be held.

There is a tendency even now to procrastinate in the handling of the tuberculosis problem as an individual one in favor of the later promotion of survey work. Individuals who should be under monthly or frequent check-up, who are coughing and showing symptoms following definite exposure to open cases and who react to tuberculin, are being permitted to continue their activities waiting for a survey set-up to become established or to get to their community in order to find out their own status.

These early infiltrations becoming established over a short period of weeks or at most a few months again emphasize the fact that the diagnosis of tuberculosis cannot be separated from medical practice. The patient-doctor relationship maintained can help in the effective execution of any contagious disease control program while routinizing the control technique may defeat the very objective for which it was created.

### CONCLUSIONES

El cambio en el diagnóstico de las enfermedades del pecho ocasionado por la prolongación del periodo de longevidad ha traído muchos nuevos problemas a nuestro campo. La roentgenografía debe continuar siendo un importante elemento en la inspección del pecho por el internista, junto con la prueba tuberculínica, la historia de exposición, los signos físicos y, lo que es posiblemente lo más descuidado y más importante, a saber, el refinamiento adicional en nuestra identificación bacteriológica del caso abierto de tuberculosis y su control subsiguiente.

Debido a la variabilidad de las sombras en la roentgenografía, causadas por estados que se han desarrollado por razón del cambio en los periodos de longevidad, ha surgido el problema clínico de evaluar tanto las nuevas sombras, prescindiendo de su ubicación, como posibles alteraciones en viejas sombras. La interpretación de viejas lesiones con respecto a alteraciones en la infiltración nos será poco valiosa en nuestro programa de control, a menos que la asocien el internista y el bacteriólogo con sus hallazgos clínicos y bacteriológicos, respectivamente. Tanto el principio como el fin de la identificación y del tratamiento de la tuberculosis han llegado a ser para el médico de familia y el internista un desafío al diagnóstico diferencial.

La repetición de censos radiográficos es importante para el fin de descubrir casos en grupos especiales. Empero, la tuberculosis, en la forma en la que la encontramos, está limitada en gran parte a

la familia y al grupo relativamente pequeño de la colectividad, donde, si se dependiera de censos, se podría desarrollar enfermedad avanzada en muchos casos mientras esperaran que se llevara a cabo un censo sistemático

Existe la tendencia aún ahora de aplazar la consideración de la tuberculosis como un problema individual y de preferir la realización posterior de investigaciones de censo. A individuos que deberían ser examinados cada mes o frecuentemente, que andan tosiendo y que manifiestan síntomas consecutivos a exposiciones bien definidas a casos abiertos, y que reaccionan a la tuberculina, se les permite que continúen sus actividades mientras se espera que se establezca un programa de censo, o que llegue a su colectividad, a fin de descubrir su condición.

Estas infiltraciones precoces que aparecen en un corto período de varias semanas, o a lo más unos pocos meses, recalcan de nuevo el hecho de que el diagnóstico de la tuberculosis no puede ser separado de la práctica médica. El mantenimiento de la relación entre el paciente y el doctor puede ayudar a la ejecución eficaz de cualquier programa de control de enfermedades contagiosas, mientras que si la técnica de control se vuelve rutinaria, ello puede frustrar el mismo objeto que inspiró su creación.

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## Discussion

H. I. SPECTOR, M.D., F.C.C.P.\*

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Dr. Burns' timely paper brings to our attention many interesting points. There is no question that our control of the communicable diseases and the generally improved living conditions has led to a prolongation of life and with it an increase in the incidence of the chronic diseases of adult life such as cancer of the lung and the cardio-vascular diseases.

For instance, it is not uncommon to see a patient recover from tuberculosis and live long enough to develop cancer of the lung and die from the disease. This fact makes the interpretation of the clinical picture as well as the x-ray shadow of the chest in general more difficult. While a certain apical lesion in a person at the age of 20 may easily be interpreted as that of tuberculosis, the same lesion in a person past 50 may present difficulties in interpretation because of the frequency of other pulmonary conditions at this age group. Interpretation becomes especially difficult in these patients with a previous history of tuberculosis in

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\*Deceased

early life from which they have recovered. We know that our tuberculous population now lives longer than in former years. In a 25 year statistical study from the viewpoint of longevity and mortality that we made in St. Louis a few years ago, we confirmed Drolet's finding that while the ultimate chances of dying from tuberculosis has not changed, the newer methods of treatment have at least led to a prolongation of life. In our own group from 33 to 47 years, in other words the average tuberculous patient now lives almost 14 years longer than previously—thus every tuberculous patient is a potential candidate for the development of those chronic lung conditions incidental to the older age groups and because of this fact interpretation of the clinical picture and especially the x-ray shadow in general becomes more difficult.

In view of the present tendency for case finding through mass roentgenography, it becomes increasingly important to remember the limitations of the x-ray and mass radiography in general in accurate diagnosis of chest conditions. After all, the roentgenogram shows a density which may or may not have clinical significance. In final analysis, the proper interpretation of this density must be based not only on the roentgenogram but also on the history, physical examination, laboratory tests and with these a common sense interpretation of the facts in the case.

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## Discussion

J. A. MYERS, M.D., F.C.C.P.  
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Dr. Burns has presented several important phases of tuberculosis control work. For many years I have been deeply interested in one of them, namely, the short interval of time that may exist between clear films of the chests of tuberculin reactors and the appearance of moderately or far advanced tuberculosis. Prior to making these observations I believed and taught that chronic pulmonary tuberculosis always begins as microscopic lesions which slowly evolve, attaining the proportion of gross lesions which cast x-ray shadows after many months or years, following which there is a period of two or three years before they produce symptoms or become contagious. Such a concept made the control of the disease appear simple in any given individual. All one had to do was ferret out the adult tuberculin reactor, make x-ray inspection of the chest every year or so and when a shadow appeared, use the available method to diagnose the etiology. Those lesions that were proved to be tuberculous could usually be controlled by

prompt treatment before the disease was contagious or caused significant symptoms

Observations lead me to believe that this situation does obtain in a majority of persons who develop chronic pulmonary tuberculosis. However, there is a definite minority who, in less than a year and often in less than six months from the time the films of the chest are clear, present shadows of extensive disease. How often this occurs among those who develop chronic pulmonary tuberculosis I have not had an opportunity to determine. It seems probable that Dr. Burns will be able to ascertain the percentage of individuals in whom this happens through the continuation of his present studies. In any event, I am convinced that the number is sufficiently large to justify definite modification in the follow-up program of tuberculin reactors. Such cases have occurred with sufficient frequency in the groups under my observation that I am satisfied that any program which provides for x-ray inspection of the chests of adult tuberculin reactors only one in two, three or five years is inadequate. In fact, I am ready to recommend that adult tuberculin reactors have x-ray inspection of the chest at least every six months, rather than annually, as was previously advised. In many parts of the United States this is now a physical possibility. It should become so everywhere, inasmuch as the in-

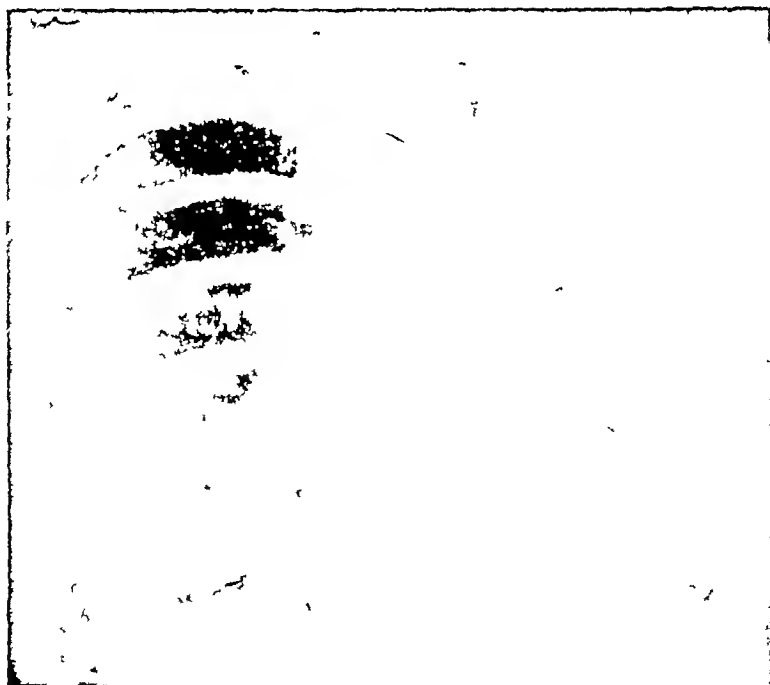


Figure 1

cidence of tuberculin reactors among adults is relatively low. For example, in an appreciable number of colleges and universities of this country less than 10 per cent of the students react to tuberculin. Thus, in a school of 5,000 students there are less than 500 reactors. Inasmuch as clinical tuberculosis appears only in the bodies of tuberculin reactors, it is far better to ferret out the reactors and make x-ray inspections of their chests every six months than to dissipate funds, time and effort of students and personnel alike by making x-ray inspections of the chests of the full 5,000 every year or so.

Probably the majority of these "sudden appearing" lesions are due to bronchogenic spread of tubercle bacilli from lesions of primary tuberculosis complexes, such as a caseous lymph node, or in some cases even the primary focus itself. The majority of such primary lesions are not demonstrable by x-ray before or after the dissemination occurs. However, such persons are always tuberculin reactors before the dissemination takes place. More-

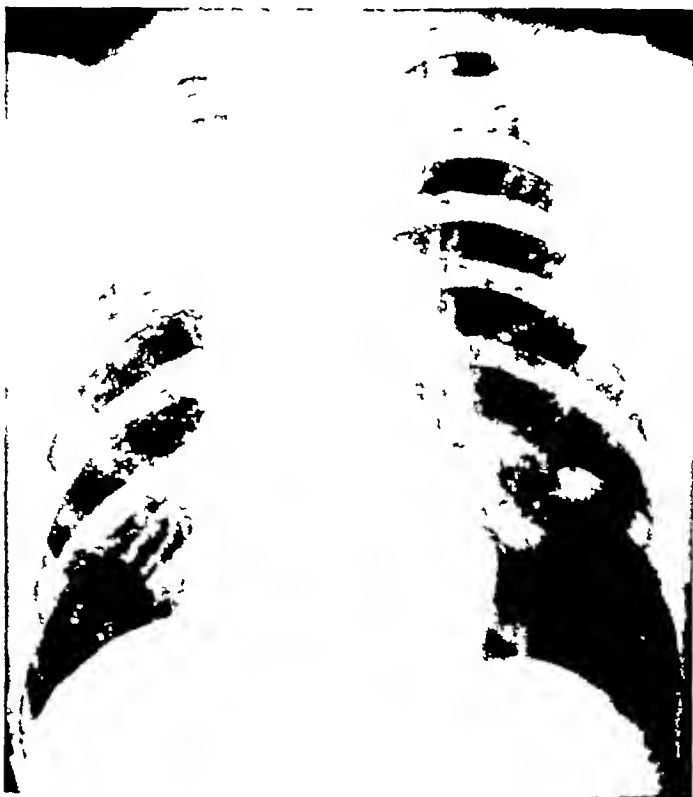


Figure 2

over, in all such cases the primary tuberculosis complex is to be found at postmortem examination, regardless of the cause of death

The sudden appearing lesions are nearly always exudative in character. Often tubercle bacilli are already present in the sputum when they are first detected. They may resolve with considerable promptness, ultimately leaving no x-ray shadows. Again, they may take on the characteristics of both exudative and productive tuberculosis, and after resolution occurs strands of scar tissue may remain. On the other hand, the disease may progress to cavity formation, therefore, prompt treatment is indicated, not only in an attempt to restore the individual's health, but also to protect the community against contagion.

In Figure 1, there is evidence of extensive disease which proved to be tuberculous in the left upper lung field. One year before, when this girl was eighteen years old, she was found to be a reactor to tuberculin. Then and six months later, however, the x-ray films of her chest were entirely clear. Therefore, the disease in the left upper lobe (Figure 1) became demonstrable some time during the six-months interval between films. No symptoms whatsoever were present which would have caused her to seek examination.

In Figure 2, there is evidence of extensive disease in the right upper lung field of a man of thirty-five years. Because he was a reactor to tuberculin periodic examinations had been made for several years. However, the films of his chest were entirely clear, up to and including the one made three months before Figure 2 was taken.

Because these rapidly appearing lesions have not been emphasized sufficiently to the medical and nursing professions, as well as the general public, physicians are frequently severely criticized when no evidence of disease is found on one date but within three to six months tuberculosis is detected in an advanced stage. While it is true that small shadows on x-ray films are often overlooked or ignored, as so often occurred at induction centers during World War II, it is also true that in a considerable number of advanced cases there was no x-ray evidence whatsoever on films made only a few months before. Such cases serve to re-emphasize the tuberculosis potentialities among adults who at the moment have no demonstrable evidence of tuberculosis except the tuberculin reaction.

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# Oleothonax

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*Sanator, South Dakota*

During recent years there has been a definite trend toward the discontinuation of this useful therapeutic procedure I feel that there is a definite place for this procedure, both for the controlling of a clinically satisfactory pneumothorax that is obliterating and in the treatment of certain cases of tuberculous empyema

In the first place an oleothorax is a much simpler procedure than a thoracoplasty The morbidity and mortality is definitely lower than with a thoracoplasty In our entire series of cases we have not had a death that can be traced to the use of oil There is much less deformity and this fact has a very definite bearing on many individuals, particularly the younger ones In some selected cases the results will be as satisfactory as with an extensive and deforming thoracoplasty It will be noted that the cases must be selected with care and it is not being maintained that all cases of obliterating pneumothorax or all cases of tuberculous empyema are suitable for this form of treatment

During the past four years seven patients have been treated by the use of oleothorax because of an obliterative pleuritis Of these seven cases, six have developed this condition as a result of a hydropneumothorax, and the oleothorax was instituted to prevent the loss of the pleural space In each case the pneumothorax was clinically satisfactory, the sputum was consistently negative Radiographically the pneumothorax showed adequate control of the disease when the oleothorax was instituted However, because of the tendency for the lung to re-expand during the presence of the hydropneumothorax the oleothorax was instituted In each of these cases the oleothorax prevented the lung from re-expanding and the collapse has been clinically satisfactory In none of the cases in which a simple hydropneumothorax was present, were we able to detect the presence of any organism, either tubercle bacillus or secondary invader, in the pleural effusion

Six of these patients are still maintaining their oleothorax Five of them are working at this time One patient has had a reactivation of disease in the contralateral lung There has been no indication of reactivation in the ipsilateral lung The seventh patient died during a minor surgical procedure for a rectal ailment, perhaps as a result of an idiosyncrasy to the anesthetic used

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\*South Dakota State Sanatorium



Four patients have had oleothorax for empyema. In all cases the empyema has been a pure tuberculous infection. In two cases the empyema has completely cleared up and there has been no evidence of any fluid formation under the oleothorax. The last fluid that it was possible to aspirate in each of these cases contained a few organisms that stained as typical tubercle bacilli but it was impossible to grow them in a culture and the guinea pig injected with the material did not show evidence of infection. It was thought that the few bacilli present were in such an attenuated form that they were non-viable. In two of these cases the pneumothorax had partially re-expanded so that the upper lobe was collapsed and there was no collapse of the lower one-half of the lung. Consequently the oleothorax was limited to only a comparatively small portion of the lung. There was less destruction of lung tissue than if a thoracoplasty had been performed. The deformity that would have been present with a thoracoplasty was eliminated, and these patients both have satisfactory collapse and control of their empyema.

The remaining two cases both had a tuberculous empyema. The oleothorax was instituted to control the empyema and to increase the collapse. In both cases the sputum had been positive and negative for several months before the oleothorax was instituted. It was hoped that the control of the empyema and the slightly greater collapse would result in a consistently negative sputum. This was not the result however, and the oleothorax had to be aspirated. A subsequent thoracoplasty did control the disease. In both of these cases the disease was so extensive that even though an oleothorax had not been employed, collapse of the entire lung would have been necessary. It is therefore not possible to say, in these two cases, that the oleothorax has resulted in thickening of the pleura with destruction of lung tissue that could have been saved if a thoracoplasty had been instituted during the early stage of the disease.

In none of our cases, in which the oleothorax was instituted to control an expanding pneumothorax, did we fail to secure satisfactory results. In none of the cases has the sputum again turned positive. We have had no cases in which fluid had formed under the oleothorax in which aspiration several times has not completely controlled the fluid formation. In none of the cases has an empyema developed when this treatment was instituted for an obliterative pleuritis. We have had no instance in which there has been a rupture of the visceral pleura and expectoration of the contents of the pleural cavity.

It has been our custom to institute an oleothorax by the injection of a few cc of 5 per cent gomenol in mineral oil into the

pleural space An attempt is made to remove any fluid that may be present before the injection of the oil Usually a reaction will be present for several days Temperature may increase to  $101^{\circ}\text{F}$  Frequently some fluid will form, but in a few days the immediate reaction will subside If fluid is still present it should be aspirated and more 5 per cent gomenol in mineral oil injected It is improbable that a reaction will follow this injection Several days later a larger amount of gomenol in mineral oil may be injected At this time the amount injected is usually 50 to 100 cc, depending on the size of the pleural space and the reaction to the previous injection Before each subsequent injection any fluid that has formed should be aspirated from the most dependent portion of the pleural space The desired amount of oil is then injected and the intrapleural pressures brought to approximately atmospheric I feel that it is well to almost completely fill the pleural space with oil during the first few injections The oil is allowed to remain and the chest is closely watched for the formation of fluid under the oleothorax This is aspirated as it forms When fluid has stopped forming the remaining space can be filled with oil and after that it should be maintained at about atmospheric pressure and checked at from four to six month intervals Usually only several cc of oil will be required to maintain atmospheric pressure

### CONCLUSIONS

I feel that there is a very definite place for oleothorax in the treatment of pulmonary tuberculosis

(1) An oleothorax can maintain a satisfactory collapse in the face of an obliterating pleuritis, if the pneumothorax is clinically satisfactory before the oleothorax is instituted

(2) In certain selected cases 5 per cent gomenol in mineral oil will render a tuberculous empyema sterile, or at least will so attenuate the organisms that they will not grow either in culture or cause tuberculosis in guinea pigs

(3) Five per cent gomenol in mineral oil has proven the most satisfactory in our hands In previous cases other materials have been used in place of gomenol These have been found satisfactory in so far as they have been used in cases of obliterative pleuritis They have not proved so satisfactory in cases of tuberculous empyema

### CONCLUSIONES

Estoy convencido de que existe un lugar bien definido para el oleotórax en el tratamiento de la tuberculosis pulmonar

(1) El oleotórax puede mantener un colapso adecuado, no obs-

tante la existencia de una pleuritis obliterated, si el neumotórax es clínicamente satisfactorio antes de que se practique el oleotórax

(2) En ciertos casos seleccionados el gomenol al 5 por ciento en aceite mineral volverá estéril un empiema tuberculoso, o por lo menos atenuará tanto a los gérmenes que no se reproducirán en cultivos ni causarán tuberculosis a cobayos

(3) En nuestras manos el gomenol al 5 por ciento en aceite mineral ha resultado ser el más satisfactorio. En casos anteriores se han usado otras sustancias en lugar del gomenol. Estas otras sustancias han sido satisfactorias cuando se emplearon en casos de pleuritis obliterated, pero no han sido tan satisfactorias en casos de empiema tuberculoso

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# Coccidioidomycosis in Phoenix, Arizona

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*Phoenix, Arizona*

Interest in the incidence of coccidioidomycosis throughout the desert areas of the western slopes of the Rockies and the southwestern desert country has been accelerated by studies made at the airbases and by the many new endemic foci which have been discovered during the past three years. The purpose of this study is to attempt to evaluate the importance of this infection in the civilian population of Phoenix and environs. Data have been accumulated that indicate that a large percentage of the population has been sensitized to the fungus. This observation is based largely upon the use of the coccidioidin skin test. Its significance seems to parallel to a large extent the significance of the tuberculin test. The diagnosis of this disease must in the majority of cases be based upon clinical manifestations, x-ray findings, and a positive coccidioidin test. It is rarely possible to make an absolute diagnosis because it is only occasionally found that the organism can be recovered on sputum examinations and by staining methods. Furthermore, the advisability of culture examinations in the laboratory is questioned because of the hazard from cultures to the laboratory technician.

In the last twenty years knowledge of coccidioidomycosis infections has progressed from the recognition of the extensive granulomatous lesions of the lungs, bones and joints, frequently terminating fatally to the present time when we know that infection with the fungus is usually mild and transitory and produces subclinical lesions more frequently unrecognized than diagnosed.

The studies of Smith and others from 1937 to 1940 demonstrated that the San Joaquin Valley was the principal endemic area of the Pacific Coast and that there is a close relationship between coccidioidomycosis and erythema nodosum and erythema multiforme. Farness focused attention on the problem of coccidioidomycosis infection in the desert area of the Southwest by reporting ten cases in southern Arizona. Aronson, et al.,<sup>3</sup> in a study of Indians in the central Arizona desert areas found a large percentage reacting positively to coccidioidin, many of whom had negative tuberculin reactions yet calcification showing in chest x-ray films. Of 700 persons examined, 14.7 per cent reacted negatively to the tuberculin test but gave positive coccidioidin reactions. This further demonstrated the similarities between hyper-

sensitivity in tuberculosis and coccidioidomycosis Butt,<sup>4</sup> in 1945, reported the coccidioides fungus forms in the capsule and margin of calcified lesions in individuals dying from other causes. In these individuals tuberculin tests had previously been done and were negative. Santa Fe Railroad employees in California, Arizona, and New Mexico showed 25.4 per cent positive coccidioidin reactions. Emmons and Ashburn<sup>5</sup> found coccidioides immitis in 15 to 16 per cent of rodents in the San Carlos and central Arizona desert area. Stiles and Davis<sup>6</sup> list many animals as host carriers. These findings mark progress in working out the epidemiology of coccidioidomycosis infections.

A survey of Phoenix public schools made at the instigation of Capt Lewis T. Bullock and carried out by the Public Health Department under one of us (H. L. McMartin), reveals the following:

TABLE I — COCCIDIOIDOMYCOSIS SURVEY  
Phoenix, Arizona, March-April, 1943

	Total Tested	No	Positive Percent	No	Doubtful Percent	No	Negative Percent
<i>Junior College</i>							
M	74	46	62.2	5	6.8	23	31
F	53	38	71.2	2	3.8	13	24.5
Total	127	84	66.1	7	5.5	36	28.4
<i>Arizona Vocational School</i>							
M	41	21	51.2	2	4.9	18	43.9
F	55	27	48.8	2	3.7	26	47.3
Total	96	48	50.0	4	4.1	44	45.9
<i>Phoenix Union and North Phoenix High School (white)</i>							
M	332	197	59.3	14	4.2	121	36.5
F	699	403	57.6	38	5.4	258	36.9
Total	1031	600	58.2	52	5.0	379	36.7
<i>Phoenix Colored High School</i>							
M	32	27	84.3			5	15.7
F	62	39	62.9			23	37.1
Total	94	66	70.2			28	29.8
Grand Total	1348	798	59.2	63	4.7	487	36.1
Material used Coccidioidin 1:100 dilution in N Saline Obtained from C. E. Smith, M.D., Stanford University Medical School							

The fact that few of these individuals reacting positively to coccidioidin give history of the clinical disease clearly indicates that in a great majority of cases infection is transitory and mild. An attempt was made to correlate the skin test with the length of residence in Arizona. It was noted from the questionnaires that were filled out by those submitting to the test that the

percentage of positive reactors increased with the length of residence in this area. There was less than one per cent who gave history of erythema nodosum or erythema multiforme. Some of our positive reactors had been in this area less than six months and in several of these histories of recent influenza-like respiratory infections were obtained.

In order to give some idea of the clinical incidence of diagnosable coccidioidomycosis infections we wish to present the experience covering a period of the last five years in Phoenix. During this time it has been our privilege to examine most of the patients in whom x-ray evidence of chest pathology was present, brought to light by the Maricopa County Health Unit, the Maricopa County Clinic of Phoenix, Arizona, and the State Tuberculosis Sanatorium, and to see many cases in private practice. Where the diagnosis of tuberculosis in these patients was doubtful a study for possible coccidioidomycosis was made.

In our series of cases two patients developed serious prolonged disabling pathology. The disease was self-limited in most cases and the active stage, with fever, cough or other symptoms seldom lasted more than a month and usually lasted only a few days. Cavity was present in three cases. Permanent changes on the x-ray film, represented by nodules or by fibrotic striation were present after recovery in six cases. Calcification as an end result, described by Butt<sup>4</sup> and others, was demonstrated in one of these cases and some of them have small nodular lesions which have gone a long way toward calcification.

From these studies it is certain that *calcification on chest films cannot be taken per se as evidence of primary tuberculosis infection*, particularly in this area. It seems quite possible that in a certain percentage of the residents near Phoenix who have calcification, the changes are due to coccidioidal infection rather than to tuberculosis. Any public health survey should include a comparative study with this in mind. It can readily be seen therefore that mass x-raying of the population here would be somewhat different in interpretation than in the Middle-West. *It is not possible to make a definite diagnosis of tuberculosis on the x-ray film alone.* Bacteriological confirmation and skin tests are necessary for accurate diagnosis. Particularly is this true in interpreting the chest films of children. Since in children x-ray and clinical manifestations are sometimes identical in the two diseases the differential diagnostic value of the skin test is greatly enhanced. If both skin tests are positive, it may be impossible to arrive at a diagnosis before the child gets well, and possibly never.

There have been many rejectees in Arizona because of calcification shown in the x-ray films of the lung. If the lesions are

multiple and granular in character, rejection by the examining board has been usual. This procedure has been predicated upon the opinion that calcification was always due to tuberculous infection and that a predisposition to reinfection with tuberculosis existed. Many individuals were deferred six months for observation, then accepted if the lesions were stationary. It is now certain that some of these calcifications were due to fungus infection and it is thought that in none of these cases would reactivation of the mild coccidioidal infection be likely. This procedure pro-

TABLE II—All patients presented symptoms of an acute respiratory infection with cough and sputum at some stage but sputum was not obtainable at the time seen in several cases. The chest x-ray in the table was the initial film in most cases but the end result in cases 1 and 6. Gastric contents were cultured in four cases. Strict rest was employed only during the period of acute symptoms and weakness.

Case	Age	Residence in Arizona	Former Residence	Erythema Nodosum	Leukocytes	CHEST X-RAY
R.P.	15	Life High School Boy		None	10,900	Small thin walled cavity, left 3rd interspace
J.A.	27	2½ years	Utah	None		Small thin walled cavity, right 2nd interspace
E.B.	39	20 years		None		Multiple calcification peribronchial thickening
D.R.	23	Life Worked at Lukefield		None 	7,300 Eos 3%	Medium sized cavity, right 2nd interspace, gradually filling
J.B.	63	3 months Lived on desert near Phoenix	Japan	2 wks	6,600	Fluoroscope — no definite chest abnormality
E.B.	34	10 months Sgt at Lukefield	New Jersey	None		3 small healed nodules, 2nd interspace
E.J.	15	Life		None	6,200 Eos 3%	Small cavity, right lower lung field
D.M.	32	2 months Teacher	Cleveland, Ohio	Yes	12,600 Eos 5%	Fluoroscope — Diffuse increase in peribronchial and hilar shadows
A.M.	64	1½ months Desert picnic dust storm	Elmhurst, Illinois	2 wks	7,800 Eos 4%	Diffuse cloudy shadow, left lower lobe
B.G.	15	4 months High School student	Lima, Ohio	None	8,300	Diffuse cloudy shadow, upper right lung, clear in 10 days
S.L.	4	Life Lives on edge of desert in Mesa		Yes	19,500	

foundly affected the lives of many individuals and a revision of the evaluation of these lesions is indicated Butt<sup>4</sup> shows that multiple calcification is frequently the result of coccidioides immitis infection and that some of the large calcium deposits are due to this fungus. The ability to calcify probably corresponds to intrinsic resistance instead of being an indication of a predisposition to reactivation of infection.

Table II presents the salient features of cases in which we felt the diagnosis clinically justified. It will be seen that the majority have very little or no sputum, and that from only one was the

TABLE II (Continued)

Sputum Smears & Cultures TB & Coccid	Coccid 1-1000 Skin Test	1 Mgm. TB Test Mantoux	Treatment	Results
Negative	4 cm	Neg	Pneumothorax, 6 mos No improvement Cavity closed 3 mos after stopping pn	Out of school 1 month
Negative	3 cm	Neg	Pn. 10 months Modified rest	Cavity closed Well
	4 cm.	Neg	Normal life	Well
Negative	4 cm	1 cm.	Modified rest	Clinically well
Negative	2 cm		Rest	Well
Positive Coccid	4 cm	Neg	Rest	Well
Negative	2 cm	Neg	Pn. 3 yrs. Diagnosis not made at onset	Cavity closed Well
Monilia Negative	2 cm	Neg	Rest	Well
No sputum	1 cm		Rest	Well
None	3 cm	Neg	Rest	Well
None	4 cm	Neg	Rest	Well



organism cultured In all cases the coccidioidin test was positive and it happened that practically all had negative tuberculin tests in spite of chest lesions shown by x-ray Case 5 had no x-ray lesion and the diagnosis rested upon the short residence in Arizona, the occurrence of symptoms of an acute respiratory infection and the occurrence of erythema nodosum and a positive coccidioidin skin test Four had erythema nodosum, four showed eosinophilia

The following two cases of coccidioidal granuloma were seen

*Case 12* H H, age 63 *Chief Complaint* Loss of weight, twenty-seven pounds in the last eight weeks *Present Illness* Began in December 1945 He complained of slight cough which had been present many years and he thought it was due to smoking but, since Christmas he had coughed more and raised sputum several times a day He was first seen February 7, 1946 He had no pain in the chest and no hemoptysis He had noticed some increasing dyspnea, slight hoarseness of the voice at times, but no loss of voice and no fever There was increasingly poor endurance and lack of appetite

*Physical Examination* The general condition was poor, temperature 98.6, height 70 inches, weight 153 pounds The cervical glands were palpable but not enlarged No axillary glands were felt The heart sounds were clear, the blood pressure 124/75 Examination of the chest revealed a few fine rales over the upper right anteriorly There was an operative scar on the abdomen and a feeling in the upper quadrant of some increased resistance The x-ray revealed a dense opacity occupying the upper third of the right lung, the lower margin of which was sharp and coincided with the lower border of the upper lobe Only a small portion of upper lobe contained air, the upper border of the lesion being irregular The density broadened toward the hilus Three direct sputum examinations were negative for tubercle bacilli and fungi Fluoroscopic examination showed the cloudy shadow as seen on the x-ray to be anterior Several consultants agreed on a diagnosis of carcinoma of the lung Exploratory thoracotomy revealed a tumor mass in the right upper lobe and the pathologist and surgeons were convinced by the gross appearance that carcinoma of the lung was the probable diagnosis The lung was removed The patient died on the third post-operative day with pulmonary edema and microscopic section demonstrated typical spherules of coccidioidomycosis Diagnosis coccidioidal granuloma

*Case 13* \* T.A is a case of coccidioidal granuloma of the nose, causing enormous swelling extending over the face, the lower eyelids and upper lip, and with lesions extending through the soft palate In December 1943, this patient was treated for erythema multiforme with recovery In September 1944 the tip of the nose became swollen and reddened The size of the swelling gradually increased over a period of months and satellite lesions developed on the alae and on the soft palate Biopsy taken in February 1945 showed coccidioidal granuloma Large doses of potassium iodide were administered with indifferent results There was no definite improvement with deep x-ray therapy Exacerbation and remission, but chronic marked redness and swelling of the nose had been

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\*Case presented by courtesy of Louis Jekel, M.D

the course In April 1946 *coccidioides mycosis* was cultured from the nose by Dr Charles Smith and serological tests were positive Vaccine therapy is now being instituted

### DISCUSSION

While infection is prevalent and common, clinically significant illness is rather uncommon and severe illness is relatively rare One proven fatal case has come to our attention in addition to the one presented Even persistent pulmonary lesions demonstrable on x-ray as infiltration shadows, cavitation or nodular lesions are rather infrequent, considering the whole group of those infected While the disease is a generalized infection, the outstanding symptoms of the clinical picture may center around pulmonary infection, but the extent to which gastro-intestinal infection may occur is not known Whether many individuals become sensitized through the gastrointestinal tract is undetermined It is known that in all cases where positive sputum cultures are obtained and in most cases where erythema nodosum is present the skin test is positive, but whether mild infection with the fungus always produces a positive skin test is not known We believe that the skin test once positive, stays positive for many years but we do not know whether it is permanently positive It seems probable that one infection producing a positive skin test reflects acquired resistance but whether subsequent infections may occur has not been determined It is now found that most cases of erythema nodosum occurring in this vicinity are due to *coccidioidomycosis* and the fact that this manifestation is rather uncommon here is one of the best indications of the relative infrequency of the clinical disease

### CONCLUSIONS

1 Data are presented to show that over half of the school population of the Phoenix area is sensitive to coccidioidin Therefore, infection must usually take place in childhood

2 A series of cases of clinical infection is presented in table form. The incidence is extremely low considering the number of sensitized individuals

3 Infection is usually mild and self-limited Relatively few cases can be proved beyond question Serious disabling disease from the infection is extremely rare

4 Two fatal cases have been reported in Phoenix, one of which is presented

5 Most diagnoses of *coccidioidomycosis* infection must be presumptive rather than absolute as the period of sputum production is usually short and sputum cultures are required

## CONCLUSIONES

1 Se presentan datos que demuestran que más de la mitad de la población escolar de la región de Phoenix es sensible a la coccidioidina. Por consiguiente, la infección generalmente debe ocurrir en la niñez.

2 Se presenta en forma tabular una serie de casos de infección clínica. La frecuencia es extremadamente baja si se considera el número de individuos sensibilizados.

3 La enfermedad suele ser leve y de limitada duración. Relativamente pocos casos pueden ser definitivamente comprobados. Es raro en extremo que esta infección cause enfermedad grave que incapacite al enfermo.

4 Se presenta uno de los dos casos fatales acerca de los cuales se han publicado informes en Phoenix.

5 La mayor parte de los diagnósticos de infección coccidioidomycótica deben ser presuntivos más bien que absolutos, pues se requieren cultivos del esputo, y el período de producción de esputo es generalmente corto.

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# Closed Intrapleural Pneumonolysis

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## INTRODUCTION

In 1882, Forlanini<sup>12</sup> of Milan proposed the induction of artificial pneumothorax in patients suffering from pulmonary tuberculosis, and in 1894<sup>13</sup> he published his experience with the first patients to be submitted to this form of therapy. In 1885 Cayley had reported the case of a tuberculous patient in whom he had induced pneumothorax by open incision of the chest wall to control hemoptysis, and in 1888 Potain, who used a manometer to measure the intrapleural pressure, published work on air replacement in tuberculous patients who had suffered spontaneous hydro-pneumothorax. Forlanini, however, was the first to induce pneumothorax with the objective of controlling the tuberculous process in the diseased lung itself. Following Forlanini, the next significant advance in artificial pneumothorax therapy was due to J B Murphy of Chicago, who in 1898 urged the use of radiology to control the degree of collapse. With the routine use of the manometer by Saugman in 1904, the technique of artificial pneumothorax was placed on a sound basis, and by about 1910 this procedure had begun to take its place as an established form of therapy in pulmonary tuberculosis.

Early in the history of artificial pneumothorax the significance of pleural adhesions in preventing effective collapse was recognized, and in 1894 Forlanini<sup>13</sup> wrote that "the pleural adhesions limit the volume of the pneumothorax and therefore its curative value." Matson,<sup>19</sup> from an experience of 1,500 patients suffering from pulmonary tuberculosis treated by artificial pneumothorax, found that 40 per cent of failures were due to pleuritic adhesions which prevented satisfactory collapse. Alexander<sup>2</sup> states that diffuse adhesions prevent induction in about 20 per cent of attempts at artificial pneumothorax, and that in approximately 42 per cent to 50 per cent of cases adhesions allow only partial pneumothorax, insufficient to bring about complete healing of the lesion.

It was inevitable, then, that attempts to devise methods of freeing adhesions should be made, and in 1908 Freidrich of Marburg divided adhesions through an incision made into the pleural cavity, this operation, known as open intrapleural pneumonolysis, continued to be practised for a number of years, but owing to the

high incidence of serious complications, "died," as Newton<sup>21</sup> has put it in discussing this procedure, "a natural and deserved death"

In 1913, Hans Jacobaeus of Stockholm devised the operation of closed intrapleural pneumonolysis. In the Jacobaeus operation, two cannulae are introduced into the pleural cavity through suitable intercostal spaces. The adhesion to be freed is visualized by means of a thoracoscope passed through one cannula, and division of the adhesion is effected by a galvano-cautery passed through the other. In 1915 Jacobaeus<sup>16</sup> published a report of his first series of patients submitted to this operation. In 1922 Unverricht published a paper on thoracoscopy, writing in 1937, Alexander<sup>2</sup> was of the opinion that Unverricht had had a wider experience of this operation than anybody. In 1934 Moore<sup>20</sup> published a series of 2,043 cases collected from the reports of 41 surgeons. Among those who have reported series of cases since 1934 are Chandler<sup>7, 8</sup> (1937), Anderson and Alexander<sup>1</sup> (1937), Brock<sup>5</sup> (1938), Drash<sup>10</sup> (1938), Edwards and Lynn<sup>11</sup> (1939), Newton<sup>21</sup> (1940), Thompson and Greenberg<sup>23</sup> (1941), Carp and Kornblith<sup>6</sup> (1942), and Goorwitch<sup>14</sup> (1943), who reported the results of 413 operations performed by four surgeons on 365 patients. In 1944 Goorwitch<sup>15</sup> published the results of pneumonolysis in 5,114 patients collected from series reported in the literature since the publication of Moore's collected series.

### STRUCTURE OF ADHESIONS

As seen through the thoracoscope, adhesions display a wide variety of forms, ranging from thin cords and narrow bands to wide, thick membranes of a complexity almost impossible to describe, and to areas where the lung is densely adherent to the chest wall over a wide extent.

Brock<sup>5</sup> has discussed the formation of adhesions. Normally, external to the parietal pleura is a thin layer of loose areolar tissue containing a few tiny blood vessels and nerves. As a result of chronic inflammation involving the pleura and extrapleural tissues, this layer becomes thickened and well defined. On the degree to which this layer and the parietal pleura retain their capacity to stretch depends the structure of adhesions as found in artificial pneumothorax. In early disease involving the pleura, before the development of fibrous tissue, upon the induction of pneumothorax these layers stretch and form the greater part of the adhesion. It is in this type of case that are seen the simpler bands and cords. As the inflammatory process becomes more chronic in character, with resulting formation of fibrous tissue, the capacity to stretch of the parietal pleura and extrapleural tissues becomes less, until finally the two layers of the pleura, together with the extrapleural tissues, become welded into a

dense layer in which no capacity to stretch remains. In such a case, when pneumothorax is induced the portion of the lung subjacent to the affected area remains firmly attached to the ribs and intercostal muscles. Between the early case, in which the parietal pleura and extrapleural tissues retain their full capacity to stretch, and the long-standing case, in which this is entirely lost, every intermediate stage is found. Several stages may be found in the one adhesion. Examination of the parietal attachment of an adhesion may reveal a central portion where the lung is densely adherent to the parietes, immediately adjacent to this the parietal pleura and extrapleural tissues may have stretched to a limited degree, while the free edge of the adhesion may be formed of stretched parietal pleura and extrapleural tissues, in which no lung tissue is present.

It will be seen that many "adhesions," as seen in skiagrams in cases of artificial pneumothorax, are in reality portions of lung attached firmly to the chest wall. A type of "adhesion" seen fairly commonly is that in which a portion of lung, perhaps containing a cavity, is drawn out into the shape of a cone, tapering to a narrow attachment to the chest wall, in this type a prolongation of a cavity may extend almost to the chest wall. In some cases a portion of lung is drawn out to form a tongue-shaped mass, which is attached to the chest wall along a margin which may be several inches in extent. From the mode of formation of pleural adhesions it can be appreciated that, except in the case of thin bands, cords and membranes, which can be satisfactorily transilluminated, the danger of cutting into lung tissue during the freeing of adhesions must constantly be guarded against. Except in the case of the simple adhesions just mentioned, enucleation of the adhesions from the chest wall should be performed, the line of separation being external to the parietal pleura. The term "cutting" adhesions conveys a wrong impression of the technique which should in most cases be followed. I prefer to use the term "free" or "release" rather than "cut."

### TECHNIQUE

The original two-cannula technique, introduced by Jacobaeus, in which the galvano-cautery is employed, is probably still that most widely practised. However, during recent years there has been a number of advocates for the use of the high-frequency current, or electrosurgery, as it is usually termed by American writers. Advantages claimed for electrosurgery are as follows:

- 1 The amount of tissue destruction on either side of the point of division of the adhesion is less than when the galvano-cautery is employed, when the latter technique is used it is held that

because of the greater tissue destruction there is the possibility of bleeding from vessels incompletely coagulated, and, later, of the separation of areas of necrosis, which have not become organized, with consequent risk of spontaneous pneumothorax

2 When electrosurgery is used, less heat is produced within the pleural cavity

3 The duration of the operation is shortened by electrosurgery

4 No smoke is produced when electrosurgery is used

Matson, who used the galvano-cautery in his earlier cases, later abandoned it in favor of electrosurgery and attributed the greater freedom from complications in his later cases to this change. Electrosurgery was used by Chandler, and is used by Moore, Drash, Newton, Cutler and others

Supporters of the galvano-cautery emphasize the following points: 1) the simplicity and relative cheapness of the equipment, 2) the greater difficulty of perfecting the operative technique when electrosurgery is used, 3) the liability to muscular spasms when electrosurgery is used, particularly in the case of adhesions situated at the extreme apex. Advocates of the galvano-cautery include Brock and Alexander, both surgeons having had experience of electrosurgery. Alexander<sup>2</sup> notes that Jacobaeus and Unverricht, both of whom used the galvano-cautery in their earlier cases, for a time employed electrosurgery but reverted to the use of the galvano-cautery.

I have used the galvano-cautery in 251 operations at which some degree of pneumonolysis was performed, in no case did there occur hemorrhage which could be attributed to the cause suggested above. In one or two of my cases it is possible that separation of an incompletely organized area of necrosis was a factor in the occurrence of spontaneous pneumothorax, nevertheless if there is a proper understanding of the technique of employing the galvano-cautery in freeing pleural adhesions, the incidence of hemorrhage and spontaneous pneumothorax should, I believe, be no greater with this method than when electrosurgery is used. More heat may be produced within the pleural cavity when the galvano-cautery is used, but I have seen no complication which I can attribute to this cause. Smoke sometimes occurs when the galvano-cautery is used, but, although occasionally a mild annoyance, has not in my experience occasioned any real difficulty.

A single cannula technique has been used by some surgeons. Electrosurgery is used, and both thoracoscope and high-frequency electrodes are introduced through a single cannula. This technique was used by Chandler and has been used in America by O'Brien, Cutler and others. In my view the ability to introduce the telescope

through a separate cannula confers on the surgeon advantages which enormously outweigh the disadvantage, which indeed is minor only, of making two punctures instead of one. The field of vision is greater, and during the operation the telescope may be moved at will without altering the position of the cutting point of the cautery, because of this facility the adhesion which is being freed may be viewed from a different angle, or perhaps a vital structure such as the subclavian artery, lying immediately outside the field of vision, may be re-examined and its position in relation to the adhesion reassessed. A very important advantage of employing separate cannulae for the introduction of the telescope and the cautery is that the surgeon is able to transpose the instruments at any stage during the operation, introducing the telescope through the cannula originally used for the cautery and *vice versa*. Frequently by changing the positions of the instruments in this manner a better approach is obtained for the completion of the operation. Also, at the commencement of an operation it is my routine procedure to inspect the pleural cavity with the telescope introduced through each cannula in turn. I have found that the added information given by examining the pleural cavity from the second position has been very valuable indeed in assessing the adhesions to be freed. I feel that the inability to do this may deprive the surgeon of information necessary for a complete assessment to be made. It is my opinion that by the employment of the two-cannulae technique adhesions may be freed which it would not be possible to attempt working through a single cannula.

A further point with regard to the use of a single cannula is that, of necessity, the latter must be of large calibre, this may be a cause of difficulty in the case of patients possessing narrow intercostal spaces.

All-important in the operation of pneumonolysis is the question of illumination. It cannot be stressed too greatly that unless the illumination is adequate even an operation which would normally present little difficulty may be rendered dangerous. Various types of telescope have been used. I have found a telescope employing right-angled vision satisfactory for the majority of adhesions, however, in the case of some adhesions situated in the extreme apex of the thoracic vault it is very difficult to manipulate the telescope so that the mirror of the instrument is sufficiently close to the parietal attachment to obtain adequate illumination. For adhesions of this type a telescope employing a more direct type of vision such as the "Forobloque"\* type is much more readily manipulated into position.

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\*Made by the American Cystoscope Manufacturers, Inc.



As regards the operation itself there are several points that may be stressed. The first essential is that the adhesion to be freed must be thoroughly examined, its limits defined, and its relation to vital structures determined, the limits of lung tissue in relation to the adhesion must be decided beyond doubt. The next point is the heat of the cautery tip. This should never be greater than that which will produce a dull red glow. When the cautery is too hot tissue is seared through, blood vessels are not coagulated, and hemorrhage is likely to occur. During the actual cauterization the tip of the cautery must always be in full view of the surgeon, failure to observe this rule may result in hemorrhage difficult to control, because the bleeding point is not clearly seen. Blunt dissection may frequently be employed, with the current off, the cautery tip is used as a dissector, the plane of dissection being external to the parietal pleura. Finally it must be stressed that closed intrapleural pneumonolysis is an operation in which meticulous care must be exercised from the commencement of the operation to the end—relaxation of vigilance for even a few seconds may easily result in irremediable disaster.

*Anaesthesia* In my series, local anaesthesia has been used except in the case of two patients. Preliminary premedication is employed, and after several methods had been tried the most satisfactory was considered to be a combination of "Nembutal" and "Omnopon". "Nembutal" (three grains) is given two hours before operation and "Omnopon" (two-thirds of a grain) one hour before. Anaesthesia is effected by infiltration of the tissues, through which the trocar is to be introduced. "Planocaine" (0.5 per cent), to which are added three minims of adrenaline solution for each ounce of anaesthetic solution, is used. Frequently four ounces, and on occasion six ounces, of this solution have been used for a single patient. No untoward effects have been observed. The average amount required for each patient is about three ounces of solution. When necessary the parietal insertion of the adhesion itself may be infiltrated by means of a long needle introduced through one cannula. In the great majority of patients infiltration of the adhesion is unnecessary, and I prefer to avoid it. The needle may puncture a small vessel and troublesome oozing may follow, in addition, when the parietal end of the adhesion is infiltrated with anaesthetic solution I have found that cauterization is rendered appreciably more difficult.

In the case of one patient, who begged to be rendered unconscious, "Avertin" was used but was not satisfactory, because, although unconscious, she became restless as soon as the parietal pleura was touched with the cautery. In this case the operation had to be abandoned.

In the case of another patient, a rather nervous girl aged fifteen years, gas and oxygen anaesthesia was employed. This operation was completed satisfactorily, but was rendered difficult because of the large respiratory excursions.

*Site of Punctures* Various sites have been recommended as the most suitable for introduction of the cannulae. Alexander<sup>2</sup> recommends that, as the majority of adhesions are in the postero-lateral portion of the chest, the thorascopes should be introduced through the anterior or antero-lateral thoracic wall and the cautery through the mid-axillary or postero-lateral thoracic wall. Brock,<sup>3</sup> on the other hand, states that he has never to his memory used an anterior puncture, and he finds the thought distasteful. Brock introduces the thorascopes posterior to the angle of the scapula in the sixth or seventh intercostal space. Alexander, again, states that on the few occasions on which he has chosen the posterior position as used by Brock it has given a relatively unsatisfactory view of postero-lateral adhesions, and that the narrowness of the posterior intercostal spaces has interfered with free and painless movement of the instrument.

I have tried a variety of puncture sites. Although formerly I<sup>3</sup> have expressed the view that the anterior and posterior axillary lines are the most suitable, I am now of the opinion that the sites recommended by Brock are to be preferred for most patients. I now always make the first puncture in the mid-axillary region and inspect the pleural cavity from this position. With the telescope still in position, I introduce the anaesthetic needle through the site projected for the introduction of the second cannula, I then visualize the point of the needle and assess the suitability of the site, and if for any reason it is considered unsatisfactory, another position is then readily chosen. Not very infrequently when there are present adhesions between the lung and the posterior region of the thoracic wall a trocar introduced posterior to the angle of the scapula will strike such an adhesion, and may even puncture the lung itself, for this reason usually it is not advisable to make the first puncture in this area. Although it is possible to strike an adhesion when introducing the trocar through the mid-axillary region, in my experience the likelihood of doing so is very much less in this area than it is in the posterior region of the thorax. With the patient lying on the side, in the usual position for operation with the side to be operated upon uppermost, there is a greater distance between lung and chest wall in the mid-axillary region than there is posteriorly, consequently the risk of puncturing the lung is much less in the mid-axillary region than it is posteriorly. Apart from the possibility just discussed of striking an adhesion when introducing the trocar pos-

terior to the angle of the scapula, in the case of an adhesion situated posteriorly in the extreme apex of the pleural cavity, I have occasionally found this site unsuitable because of the difficulty of tilting the cannula introduced through it to a sufficiently acute angle to enable the instrument passing through it to be brought into a suitable position in relation to the parietal end of the adhesion. In such a case the second cannula must be introduced through the postero-lateral region of the thorax.

A manoeuvre which I have frequently employed with success, particularly in the case of an adhesion situated dangerously close to vital structure such as the subclavian artery, is the introduction of a third cannula. Through this cannula is passed a retractor. The retractor is placed in position so that the adhesion is lifted away from the vessel, or in some cases so that the lung is retracted to give a better approach to the adhesion. The assistant then takes the retractor. The disadvantage of this manoeuvre is the number of instruments crowded together in a relatively restricted area, in addition the assistant must hold the retractor blindly, being unable to see what she is doing. Nevertheless by employing a third cannula I have, in an appreciable number of patients, been enabled to complete the freeing of adhesions which otherwise I could not have attempted.

I do not think that painstaking attempts to map out the adhesions prior to operation, with the object of planning precise puncture sites accordingly, are repaid. Frequently the adhesions prove, on thoracoscopic examination, to be very different from the preoperative conception, and often adhesions unsuspected prior to operation are found.

### INDICATIONS FOR OPERATION

Although occasionally one sees patients in whom artificial pneumothorax, prevented by adhesions from effecting complete relaxation of the lung, is followed by closure of cavities, and even by healing of the lesion in the great majority of such cases, the disease remains uncontrolled. Cavities not infrequently become smaller in the presence of incomplete pneumothorax, but rarely do they close completely, and so long as a residual cavity persists, there remains to the patient the potential danger of bronchogenic spread of the disease. Rich,<sup>22</sup> in discussing the bronchogenic spread of tuberculosis, wrote as follows:

The site of origin is ordinarily a cavity, and it may even be quite a small one. It is not infrequently necessary to search the lungs carefully, by making thin sections with a sharp knife, in order to find a small cavity, that may be only half a centimetre in diameter, from which the bacilli responsible for small foci of tuberculous pneumonia in other portions of the lung were discharged.

Whilst all pleural adhesions do not necessarily prevent effective collapse, particularly in the case of basal adhesions, nevertheless any adhesions over the site of a lesion must be prejudicial to healing. Even when no cavity is obvious the continual tugging with each respiration over an area of active exudation is likely to prevent healing and even to cause spread of the process.

Brock,<sup>5</sup> writing in 1938, made the following statement

Most experienced workers now agree that even though cavities do not appear to be present in the lung that is held by adhesions, and although symptoms are absent or minimal, it is not safe to leave such a lung incompletely collapsed, if study of the earlier films shows that the adhesions are controlling areas of what was active disease.

A further aspect of the incomplete pneumothorax is the question of complications. There is general agreement that the more serious complications of artificial pneumothorax therapy, namely spontaneous pneumothorax, persistent effusion, empyema and obliterative pleuritis, are much more common in those patients in whom the pneumothorax is complicated by adhesions than when a technically satisfactory collapse is present.

I have been interested to compare the results in my earlier cases of artificial pneumothorax with those in the more recent group, in which practically all patients with adhesions have been given the opportunity of having thoracoscopic examination, and when possible, pneumonolysis. Both from the point of view of absence of complications and from that of control of the pulmonary lesion, the results in the latter group are much the better, this, of course, has been noted by numerous observers in Europe and America. However, it strengthens me in the view that rarely should thoracoscopy be withheld from the patient in whose case an artificial pneumothorax, worth continuing at all, is rendered ineffective by adhesions.

### SUITABILITY FOR OPERATION

Alexander<sup>2</sup> gives as his experience that relatively few patients having artificial pneumothorax therapy have adhesions suitable for pneumonolysis, and he holds the view that less than 25 per cent of patients having this form of collapse therapy should be submitted to operation. Edwards and Lynn<sup>11</sup> are of the opinion that with the aid of pneumonolysis complete collapse can be obtained in over 30 per cent of all cases of artificial pneumothorax. I believe that Alexander is unduly conservative in his view that less than 25 per cent of patients having artificial pneumothorax therapy are suitable for pneumonolysis.

The decision regarding suitability of any individual patient for

operation rests primarily on the skiagram. In a few cases the film indicates extensive pleural symphysis, which would obviously render impossible any attempt at pneumonolysis. In a few patients also the presence of simple cords and bands may be deduced with reasonable certainty. In the great majority of patients the nature and extent of adhesions cannot be determined from the skiagram alone, although usually it is possible to form a reasonably accurate estimate of their general complexity and to reach a conclusion as to whether operation is likely to be difficult. In my experience, in the case of patients about whom prior to operation I have formed the opinion that it was unlikely that pneumonolysis could be carried out, I have seldom been mistaken, on the other hand I have not infrequently found that in the case of patients in whom I had hoped to perform a complete operation, either pneumonolysis could not be done or could be performed only in part.

Fluoroscopic examination is a valuable aid in the assessment of adhesions, and in the case of a few patients oblique films have helped me considerably.

Some authors believe that considerable value attaches to stereoscopic films. Newton<sup>21</sup> expressed the view that stereoscopic films are obligatory, but later admits that too much dependence cannot be placed on them and that the final decision as to operability can be made only after thoracoscopic examination. Brock<sup>5</sup> has used stereoscopic films rarely, and "only when they have been supplied." Alexander,<sup>2</sup> although advising stereoscopic films, believes that the final decision regarding operation rests on the result of the fluoroscopic examination. With the view that in the great majority of cases the decision to undertake pneumonolysis can be made only after visualization of the adhesions through the thoracoscope I am in agreement.

At operation it is not infrequently found that what may appear on the skiagram as a simple cord is the edge of a broad membrane. Three cords as seen on the skiagram may prove to be the three edges of an adhesion which is T-shaped on cross section. An otherwise simple adhesion may be found at operation to be attached to a vital structure, as a consequence of which operation is rendered impossible. In my series, in an appreciable number of patients having adhesions attached to the extreme apex of the thoracic vault the parietal attachment of the adhesion has been either in close proximity to or directly over the subclavian artery. By using a third cannula as described above, I have been able to free a proportion of these adhesions, but there have remained a number of patients in whom I have considered that any attempt at pneumonolysis would have been far too hazardous. Frequently adhesions are found whose presence was not suspected prior to

operation One type of adhesion which should be left untouched when found is the broad membrane holding up a large peripheral cavity In this type of adhesion the peripheral wall of the cavity probably receives the greater portion of its blood supply through the adhesion To sever the adhesion is likely to lead to sloughing of the cavity wall, with consequent development of spontaneous pneumothorax

The decision whether to operate in patients in whom extensive adhesions are present sometimes requires the exercise of considerable judgment A situation not uncommonly met is where the apex of the lung is held up by an extensive adhesion, frequently highly complex in form and arrangement Examination of such an adhesion may reveal that it would be possible to free the adhesion in a large part of its extent, but that complete freeing could not for technical reasons be achieved I have carried out partial pneumonolysis in a number of such cases, and have in some of them obtained an excellent result Nevertheless, I am somewhat averse to undertaking partial pneumonolysis of this type I feel that there is the risk that the unfreed portion of the adhesion may tear further, with the possibility that spontaneous pneumothorax may result, particularly in the case of apical adhesions situated posteriorly, I do not like leaving an adhesion partly freed, in several cases in which I have done this with the intention of completing pneumonolysis at a further session, at the subsequent operation the lung has been found to have become densely adherent to the chest wall, precluding any further attempt at freeing the lung

Assessment of adhesions through the thoroscope may reveal that there is a number of simple adhesions which could readily be freed, but that the main adhesion present could not be freed Freeing of adhesions which cannot result in any benefit to the patient is merely meddlesome, and is to be strongly deprecated

#### DURATION OF PNEUMOTHORAX BEFORE OPERATION

It has been advised in the past that a sufficient period should be allowed for the adhesions to stretch before pneumonolysis is attempted Alexander<sup>2</sup> has stated that pneumonolysis should not be undertaken in the average patient until three to six months after the induction of pneumothorax However, it is to be remembered that with the passage of time fibrous tissue formation takes place in the adhesion, which becomes shorter, tougher and broader, as a consequence of this, operation is rendered more difficult Further, if pneumonolysis is delayed for several months there is the risk that complications such as spontaneous pneumothorax may occur during the period of waiting The attempt to

stretch adhesions by the use of positive pressure is highly dangerous, and cannot be condemned too strongly, tearing of the adhesion at the visceral end may occur, with consequent development of spontaneous pneumothorax. Finally, if operation is deferred unnecessarily, time is being wasted, since in the estimation of the period in which pneumothorax should be continued in any patient the date at which the pneumothorax is rendered effective must be considered as the date of commencement.

Newton<sup>21</sup> advises operation as soon as the maximum collapse obtainable without the use of high pressures has been reached, provided that a sufficient space exists and the adhesions seem operable. Thompson and Greenberg advocate operation about three weeks after induction of pneumothorax. My own view is that operation should be undertaken as soon as an adequate space is present in which to work. In one patient I performed satisfactory pneumonolysis thirteen days following induction of pneumothorax, I have frequently operated fourteen days following induction of pneumothorax, and in the majority of patients there is little reason to delay operation beyond this period. In the case of patients with the more complex type of adhesions a rather longer waiting period is sometimes necessary to gain an adequate space in which to work, but as stressed above, forcing by positive pressure should never be resorted to.

## THE PRESENT SERIES

### *Clinical Material*

The clinical material on which this study is based is set out in the following scheme:

Total number of thorascopic examinations (including more than one operation on the same patient and operations at which thorascopic examination only was performed)	311
Number of individual pleural cavities inspected	268
Number of patients to have both pleural cavities inspected	17
Number of persons to have thorascopic examination of one or both pleural cavities	251
Number of lungs upon which pneumonolysis, complete or incomplete, was performed	225
Number of patients to have pneumonolysis performed on both lungs	15
Number of persons to have pneumonolysis performed on one or both lungs	210
Total number of operations at which some stage of pneumonolysis was carried out	251

In the case of one pleural cavity four thorascopic examinations were carried out.

In the case of four pleural cavities three thorascopic examinations were carried out

In the case of 32 pleural cavities two thorascopic examinations were carried out

In the case of 231 pleural cavities one thorascopic examination was carried out

Complete pneumonolysis was performed in the case of 123 lungs Incomplete pneumonolysis was performed in the case of 102 lungs Pneumonolysis was not attempted in the case of 43 lungs By complete pneumonolysis is meant that all adhesions preventing effective collapse of the lung were freed By incomplete pneumonolysis is meant that in the case of multiple adhesions some, but not all, of the restraining adhesions were freed, or in the case of a single large adhesion, that a significant portion was freed

The results in the first 115 patients in whom thorascopic examination was carried out have already been published<sup>3</sup> Of the 311 operations, 229 were performed at the Canterbury District Hospital and 82 at the Royal North Shore Hospital

In Table I are shown figures which indicate, in the case of a few representative published series, the proportion of patients submitted to thorascopic examination in whom pneumonolysis, complete or incomplete, was carried out

TABLE I

Author	Total Number of Patients	Complete Pneumonolysis	Incomplete Pneumonolysis	Pneumonolysis Not Attempted
		<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Anderson and Alexander	111	41 (37.0)	46 (41.4)	24 (21.6)
Edwards and Lynn	255	86 (34.0)	140 (55.0)	29 (11.0)
Carp and Kornblith	100	32 (32.0)	43 (43.0)	25 (25.0)
Matson	249	154 (61.9)	19 (7.6)	76* (30.5)
Brock	361	—	—	59 (16.3)

\*With regard to these 76 patients reported in Matson's paper, the following comment is made by the author "This group comprised cases unsuitable for operation. In most cases minor adhesions of no technical importance were severed"

Goorwitch found that of the 5,114 patients in his collected series who had pneumonolysis performed, in 52 per cent the operation was complete and in 48 per cent it was incomplete

Of the 102 lungs upon which incomplete pneumonolysis was carried out, satisfactory relaxation followed in 44 cases. This result indicates the importance of freeing all adhesions preventing relaxation of the lung whenever possible, on the other hand, that



of 102 cases in which incomplete pneumonolysis was carried out satisfactory relaxation of the lung followed in 44 shows that the incomplete operation may not infrequently result in a satisfactory pneumothorax being obtained

### TYPE OF ADHESIONS

The patients in my series are not a selected group, and include a large number who have had advanced disease. The largest single group in the series comprises patients referred from a sanatorium to which patients with early disease ordinarily are not sent. Indeed in studying the history and original skiagrams of patients upon whom I have performed thoracoscopy I have been impressed by the late stage at which so many have come under treatment. In the majority of patients this has seemed to be because of the late stage at which patients themselves have felt the need to seek medical advice. It seems that if patients are to come under treatment when the disease is at an early stage a State-wide scheme involving the use of photofluorography will be necessary. Several of the patients in my series came under treatment following investigations consequent on the finding of suspicious signs on routine photofluorographic examination of the chest at the time of enlistment in one or other of the services, a few women are included in this group.

I have arbitrarily divided the adhesions seen into four grades, according to their number and complexity, as follows: grade I, not extensive (for example, one or two simple cords or narrow bands, or one rather wider band), grade II, moderately extensive (for example, two or three bands about one inch wide, or one fairly wide band, in one of my cases there were present one thick adhesion about one and a half to two inches wide, one narrow band and one short membrane about one inch wide), grade III, extensive (for example, in one of my cases, ten bands of varying widths, thicknesses and lengths were present), grade IV, very extensive (in most of these patients pleural symphysis was present over wide areas, and in most pneumonolysis was not attempted, although in a few cases partial freeing of the lung was possible).

In accordance with this classification, in 32 cases adhesions classed as grade I were present, in 65 cases adhesions classed as grade II were present, in 110 cases adhesions classed as grade III were present, and in 58 cases adhesions classed as grade IV were present. In the case of three patients in whom the presence of adhesions was suggested by the appearance of the lung contours on the skiagram, no adhesions were found on thoracoscopic examination.

### CONTRALATERAL DISEASE

Of the 251 patients upon whom thoracoscopic examination was carried out, bilateral disease was present in 143 cases. Pneumonolysis was carried out on 225 lungs, in 32 cases contralateral pneumothorax was being maintained at the time of operation. In addition, contralateral artificial pneumothorax was being maintained in the case of four patients in whom thoracoscopic examination only was carried out.

### DURATION OF PNEUMOTHORAX PRIOR TO OPERATION

The shortest period from the time of induction of pneumothorax to the time of operation was thirteen days, and the longest three years. In 110 cases pneumothorax had been present for less than three months, in 83 cases from three to six months, in 60 cases from six to twelve months, in 11 cases from twelve to eighteen months, in one case from eighteen to twenty-four months, and in three cases over two years.

### AGE OF PATIENTS

The youngest patient in the series was fifteen years old and the oldest was aged forty-eight years. Chandler,<sup>7</sup> in his series, records that he operated upon a child aged seven years, the same author notes that he also operated upon a patient aged fifty-four years.

### FINAL ASSESSMENT

Goorwitch,<sup>15</sup> in discussing the results of pneumonolysis, expresses the view that any beneficial results occurring in patients who have had pneumonolysis performed must be attributed to the artificial pneumothorax, which is merely rendered more effective by the operation. This is, of course, true, nevertheless I believe that it is not unprofitable to attempt to determine those patients in whom, without operation, pneumothorax would not have succeeded in controlling the diseased process but in whom, following pneumonolysis, a more effective collapse has been enabled to do so. The criteria of a successful operation are the subsequent closure of cavities, the inability to recover tubercle bacilli from the patient by modern methods of investigation, such as culture of the fasting gastric contents, and the absence of complications which have caused any permanent detriment to the patient. In any given patient, to decide whether artificial pneumothorax, which has been successful following pneumonolysis, would not have been successful if no operation had been performed is often very difficult, and maybe impossible. Nevertheless for an observer experienced in artificial pneumothorax therapy, I believe that in

the majority of cases it is possible to reach a conclusion. Consequently, in respect of this series, the attempt has been made to divide the results into successful and unsuccessful, in accordance with the ultimate benefit to the patient. In some cases, although complete relaxation of the lung was obtained cavities have not closed, in these cases, although technically the operation was a success, it was a failure from the point of view of the patient. In a few patients in whom complete relaxation of the lung was obtained serious complications have occurred. There have also been some patients in whom pneumonolysis appears to have been followed by control of the disease in the lung operated upon, but whose ultimate fate will depend on measures directed to the other lung in which uncontrolled disease is present. It seems not unreasonable to assess the result of operation in these patients as provisionally successful. Also, in the case of a few of the patients who have had bilateral pneumonolysis performed, while the operation on one lung appears to have been followed by control of the lesion in that lung, as regards the other lung the result is still in doubt or has been unsuccessful. The result of operation in the case of each lung in those patients who have been submitted to bilateral operation will be indicated.

Two hundred and ten persons had pneumonolysis performed, 15 of these having had both lungs operated upon. In the case of 111 of these patients control of the disease appears to have occurred or seems likely to occur, in the case of 13 patients the operation has been classed as provisionally successful, in the case of 57 patients the operation has been unsuccessful, and in the case of 29 patients it is considered that too short a period has elapsed for a final conclusion to be drawn. Of this last group of 29 patients, which includes six in whom bilateral pneumonolysis has been carried out, an excellent final result is confidently hoped for in at least 10 cases, but I prefer not to include these among the "successes" at this stage.

Of the 15 patients in whom bilateral pneumonolysis has been carried out operation appears to have been followed by control of the lesion in both lungs in six cases, two patients are included in the group noted above, in whom a favourable outcome is confidently hoped for, in the case of three patients, while the disease in one lung appears to be under control the outcome in the case of the other lung is still in doubt and other measures may need to be instituted. In the case of two patients too short a period has elapsed for an opinion to be given. As regards the remaining two patients, although in one of them excellent relaxation of both lungs is present, it is considered that the ultimate outlook is unsatisfactory.

Of the total of 225 lungs upon which pneumonolysis was performed, operation appears to have resulted in a pneumothorax which was effective in controlling the lesion in the lung concerned in 130 cases

Of the 5,114 cases in Goorwitch's collected series, 73 per cent were considered to be clinically successful

### COMPLICATIONS

Complications of pneumonolysis include hemorrhage, persistent nonpurulent effusion, spontaneous pneumothorax, bronchopleural fistula, empyema and contralateral spread of the disease. A late sequel may be obliterative pleuritis. Less important complications seen include transient serous effusions, surgical emphysema, post-operative vomiting, injury to nerves and dyspnea during operation. Pleuro-cutaneous fistula may occur as a complication of empyema, forming along the needle track following aspiration, a fistula also may be the result of *empyema necessitatis*.

**Hemorrhage** Hemorrhage may occur from the site of separation of the adhesion, from injury to a major vessel such as the subclavian artery, or, rarely, from injury to an intercostal artery by the trocar.

In order to lessen the risk of injury to the lung, adhesions should be divided flush with the chest wall, or preferably in the majority of cases enucleated from the chest wall. This increases the risk of injuring an intercostal vessel or one of its branches. However, with adequate experience and careful attention to technique I am firmly of the opinion that hemorrhage from this source should rarely if ever occur. In my series there were three patients who suffered severe hemorrhage. These patients were operated upon at an early stage in my experience, and over 200 consecutive operations at which pneumonolysis was actually carried out have since been performed without the occurrence of any but minor hemorrhage, which has easily been controlled.

Hemorrhage has been reported to have occurred through opening into one of the great vessels. Alexander<sup>2</sup> notes that Gullbring reported the death on the operating table of a patient whose subclavian artery had been opened into. Goorwitch<sup>15</sup> states that he has personal knowledge of three instances of operative injury to the mediastinal vessels with a rapidly fatal outcome. Many adhesions are situated in the extreme apex of the thoracic cavity where the approach to the adhesion may be very difficult and where it is frequently necessary to apply the cautery in close proximity to the subclavian artery, however, careful appraisal of the adhesion to be freed and identification of the great vessels before commencing cauterization, and above all, unremitting care

during the operation should prevent the occurrence of this catastrophe

Rarely, troublesome hemorrhage occurs as a result of the trocar puncture. In the case of one patient in my series steady, although not severe, hemorrhage was still present at the termination of an operation which had lasted about forty minutes. The hemorrhage appeared to come from just inside the internal opening of the puncture. It is possible that this hemorrhage would have stopped spontaneously, however, a third cannula was introduced and the cautery passed through it. The tip of the cautery was then carefully inserted into the bleeding opening and the area from which the hemorrhage appeared to be coming was coagulated. This manoeuvre was successful in stopping the hemorrhage. Goorwitch<sup>15</sup> notes the occurrence in one of his own patients of hemorrhage the source of which he believes to have been an intercostal vein traumatized at operation by the trocar.

Blood vessels of any magnitude are seldom present in the adhesion itself. However, in one of my cases tortuous veins about one-eighth of an inch in diameter were present on the surface of a band about one inch wide. I was able to coagulate these veins and the adhesion was freed without incident. As regards the three patients mentioned above who suffered severe hemorrhage, death from blood loss did not occur in any case. One patient later developed tuberculous empyema, and this case will be fully considered in a later section. In the case of the two patients, both of whom had advanced bilateral disease, in spite of repeated aspiration the hemorrhage rapidly became loculated and later became organized, although empyema did not follow in either case. One of these two patients died two months following operation, the cause of death being the burden of an organized hemothorax added to extensive bilateral disease. The other patient lived for six months. This, in the opinion of his physician, was his expectation of life had no operation been performed.

Table II shows the incidence of hemorrhage in a number of reported series of patients. In the attempt to compare different series, not infrequently difficulty is experienced because various authors interpret incidents differently. For example, Matson,<sup>18</sup> in one paper, refers to a hemorrhage involving the loss of two litres of blood as "moderate", other authors might class a hemorrhage of this order as serious. Drash,<sup>10</sup> in reporting three cases of hemorrhage in his series, noted one as "serious" and two as "moderate", nevertheless in two of these cases open operation was necessary to control the bleeding.

At this stage, in order to avoid repetition, I will discuss the general question of recording complications. Some authors, for

example Edwards and Lynn,<sup>11</sup> have shown complications as a percentage of all operations performed, irrespective of whether pneumonolysis was performed or not or whether the total includes more than one operation on the same patient. Calculated in this manner, complications in my series would be based on a total of 311 cases. Anderson and Alexander<sup>1</sup> have shown complications as a percentage of the total number of patients upon whom thoracoscopic examination was carried out, inclusive of those patients in whom pneumonolysis was not done. For my series, counting each pleural cavity inspected as an individual (*vide infra*), the corresponding basis of calculation would be 268. Again, others, such as Brock,<sup>5</sup> take the total number of operations at which any degree of pneumonolysis was performed. The corresponding figure in my series would be 251. Obviously such variable methods of indicating results leads to hopeless confusion when comparing the records of various authors, and some uniform basis of comparison must be decided upon.

It is true that every operation carries its own risk of complications, but as regards thoracoscopic examination in patients in whom pneumonolysis is not done I feel that the risk of subsequent

TABLE II

Author	Number of Operations	No. of Cases of Severe Hemorrhage	No. of Cases of Small Hemorrhage
		Per cent	Per cent
Anderson and Alexander	87	0	0
Brock	360	3 (0.8)	
Carp and Kornblith	75	2 (2.6)	
Drash	251	1	2 (moderate)
Edwards and Lynn	231	1 (0.4)	6 (2.6)
Goorwitch (four surgeons)	413	12 (2.8) (1 000 cc. or more)	24 (5.8) (500 cc. or less)
Goorwitch (collected series)	5,886	(1.7)	(3.3)
Jacobaeus	600-700	2	
Matson	249*	3	
Moore (38 surgeons)	2,043	15 (0.7)	16 (0.8)
Newton	182	0	
Unverricht	950	0	
Viswanathan	50	2 (4.0)	

\*See footnote to Table I

complications attributable to the operation is so small that such complications should be shown separately from those following pneumonolysis. Again, in the case of those patients who have required more than one operation, my own feeling is that except in the case of hemorrhage complications should be estimated on the basis of the number of lungs operated upon rather than the number of operations. As regards hemorrhage, I believe it is reasonable to estimate the occurrence of hemorrhage as a percentage of the total number of operations at which pneumonolysis in any degree was carried out. In those patients in whom pneumonolysis has been performed on both lungs each lung of course presents an entirely individual problem from the point of view of complications.

To summarize my views, I believe that cases of hemorrhage should be shown relative to the total number of operations at which pneumonolysis was carried out, and that all other complications should be shown on the basis of the number of lungs upon which pneumonolysis has been carried out. As far as possible, I have endeavoured to follow this scheme in compiling the tables shown in this thesis.

In Goorwitch's collected series there are 5,114 patients, upon whom 5,886 operative stages were carried out. Except in the case of obliterative pleuritis and loss of pneumothorax space, Goorwitch has shown the incidence of complications as a percentage of the number of operative stages. Where necessary, I have modified his figures so that they are shown as percentages of the number of patients. In studying Goorwitch's statistics one is struck by the number of authors quoted in his series who have failed to record relevant data, for example, with regard to such an important complication as tuberculous empyema. Goorwitch was able to collect information in the case of two-thirds of the total number of patients only, while as regards obliterative pleuritis the incidence was recorded in one-quarter of the total number of patients. I have experienced similar difficulties in studying the records of some authors.

*Pleural Effusion* Alexander<sup>2</sup> is of the opinion that a small amount of serous exudate confined to the costo-phrenic sinus probably occurs in the majority of patients. Brock<sup>5</sup> states that a slight amount of fluid after operation is inevitable, owing to the trauma inflicted and to oozing from the site of puncture. Smoke has been cited as a cause of serous effusion when the galvano-cautery is used. Smoke has, however, rarely been of consequence in my cases, and I believe that it is unlikely to be a causative factor in fluid formation. Fluid of the type mentioned is absorbed within a week or so, and is of no importance.

Of the 268 pleural cavities inspected, fluid in sufficient amount to be visible on the skiagram was present in 22 cases prior to operation. In two of the patients in this group a persistent non-purulent effusion developed. In one patient there occurred an effusion, moderate in amount, which was absorbed in the course of two or three weeks. In two patients empyema occurred. In the case of one patient in whom a considerable amount of fluid was present prior to operation, the effusion persisted at about the same level, and about seven months later obliterative pleuritis became evident. In the case of these six patients pneumonolysis was performed. No complication occurred in the remaining sixteen patients, in whom the fluid present prior to operation was absorbed subsequently.

In the case of two patients not included in the last group empyema was found at thoracoscopic examination, in neither of these patients was pneumonolysis attempted. In the case of 17 patients in whom fluid could not be detected on the skiagram prior to operation, non-purulent fluid classed as "much" or "persistent" developed subsequent to operation. By "much" is meant an amount sufficient, with the patient in the erect position, to show on the skiagram a "fluid level" higher than the dome of the diaphragm. By "persistent" is meant fluid which persisted for a period longer than four weeks. In at least two patients included in this group the fluid was not very great in amount and it was absorbed within two or three weeks, since the fluid seemed to be the result of a pleural reaction not severe in degree, but definite, these cases are recorded in this group. One of the patients in whom a persistent effusion occurred had been submitted to thoracoscopic examination only, the remaining sixteen patients in whom there developed an effusion classed as "much" or "persistent" had pneumonolysis, complete or incomplete, performed. Consequently, of the 225 cases in which pneumonolysis was carried out a non-purulent pleural effusion classed as "much" or "persistent" followed in 20 cases (9 per cent), this number includes those cases in which fluid was noted in the pleural cavity before operation and in which, following operation, a pleural reaction occurred.

Of the 43 patients in whom thoracoscopic examination only was performed, a pleural effusion of the type under discussion followed in one case, it is of interest, and may be of significance, that pleural tubercles were seen in the case of this patient.

The importance of the occurrence of a pleural effusion of this type in my cases rests in the fact that of the 20 patients in this group, in no fewer than 12 obliterative pleuritis developed at some period subsequently.



In 14 patients, including the two mentioned above, in whom non-purulent fluid was noted prior to operation, empyema developed at some period subsequent to operation. These patients will be discussed fully in a later section.

There then remain 173 patients in whom no fluid was noted on the skiagram prior to operation and in whom, subsequent to operation, either fluid, in amount sufficient to be visible on the skiagram, did not occur or there occurred fluid, slight in amount, which was rapidly absorbed and was not of clinical significance. If to these 173 patients are added the 16 patients in whom fluid noted prior to operation either was absorbed completely subsequent to operation or else persisted for a few weeks in an amount just visible in the costo-phrenic sinus, it is seen that of 225 cases in which pneumonolysis was carried out in 189 no pleural reaction occurred, of the 43 cases in which thoracoscopic examination only was made, which include the two patients in whom empyema was found but in whom no further reaction followed operation, no pleural reaction resulted in 42 cases.

In Table III an attempt is made to compare the incidence of non-purulent effusion in a few recorded series. In compiling this table difficulty has been experienced in appreciating the significance to be attached to such terms as "very small," "moderate" et cetera, as used by different authors. In this table, "number of patients" refers to the number of lungs upon which pneumonolysis was performed.

TABLE III

Author	Number of Patients	Number of Cases of Pleural Effusion	
		Transient or Very Small	Moderate Much or Persistent
		Per cent	Per cent
Brock	302	81 (26.8)	37 (12.2)
Chandler	157	8 (5.1)	28 (18.0)
Edwards and Lynn	226	20 (8.8)	26 (11.5)
Goorwitch (four surgeons)	375	48 (12.8)	27 (7.2)
Goorwitch (collected series)	5,114	(16.0)	(10.9)
Newton	148	18 (12.0)	8 (5.4)

*Empyema* Empyema following pneumonolysis may be tuberculous in origin, it may result from pyogenic infection, or mixed tuberculous and pyogenic infection may be present. Pyogenic infection, I believe, only rarely follows infection introduced into the pleural cavity at operation, when it occurs, pyogenic infection

of the pleural cavity is usually the result of spontaneous pneumothorax. Occasionally a tuberculous empyema which is being treated by repeated aspiration may become infected, with this possibility in mind it should be a *sine qua non* that all aspirations must be performed with the strictest aseptic technique. A purulent exudate may follow injury to the lung at operation, or a small area of necrosis which has failed to become organized may separate from the surface of the lung during the period immediately subsequent to operation. In one patient in whom spontaneous pneumothorax occurred three weeks following operation I believe that this was the mode of development. In some patients a persistently recurring serous effusion may gradually become purulent after many weeks.

Drash<sup>10</sup> has discussed the development of empyema following pneumonolysis in a very valuable paper. He cites the work of Joannides,<sup>17</sup> who was able to demonstrate the presence of very small tubercles on the surface of the pleura. These tubercles may very readily be dislodged—for example, by continually being washed by an effusion. Fibrin plaques on the pleural surface often contain tubercle bacilli. If such tubercles or plaques are present close to the insertion of an adhesion, it is not difficult to imagine that bacilli may be set free during the manipulations incident to the freeing of the adhesion. Again, tubercle bacilli may become sealed between the visceral and parietal pleura where the two layers have become fused at the site of chronic disease. If during the freeing of an adhesion this zone is opened into, bacilli may escape into the pleural cavity. It must again be stressed that in freeing an adhesion, except in the case of thin bands and cords which are formed of stretched parietal pleura and extrapleural tissues and which can be satisfactorily trans-illuminated, the plane of separation should be external to the parietal pleura. A further possible source from which bacilli may enter the pleural cavity is from lymphatics coursing through an adhesion. These lymphatics may contain tubercle bacilli. During the freeing of an adhesion these lymphatics may be torn or divided and the openings made not be sealed over, from these incompletely sealed channels bacilli may escape.

The presence of tubercles on the pleura when seen through the thoracoscope is an important danger signal to the surgeon, and considerable caution should be exercised before a decision is made to proceed with pneumonolysis in their presence. Unverricht is stated by Alexander<sup>2</sup> to have found that there is great danger of tuberculous empyema resulting if pneumonolysis is carried out when tubercles are present, even at some distance from the divided adhesion. In Anderson and Alexander's<sup>1</sup> series, tubercles were

present in "at least seven" of their 111 patients. In the case of two patients only was pneumonolysis performed, in one of these patients a tuberculous empyema occurred.

In the course of my inspection of 268 pleural cavities, pleural tubercles were found in 14 cases. In six cases no attempt at pneumonolysis was made. In one of these patients two weeks following operation a pleural reaction occurred, accompanied by an effusion which persisted for a number of weeks, this patient has been mentioned above in the discussion on pleural effusion. One patient had complete pneumonolysis performed by the freeing of ten adhesions of various widths and lengths, recovery was uneventful in this case. Seven patients each had a number of adhesions freed. In the case of five of these patients convalescence was uneventful. One of the other two patients, for whom six adhesions of various types were freed, had a number of tubercles arranged in the form of a rosette on the parietal pleura, in the center of this rosette was attached a thin band about half an inch wide, which was seen to pull on the parietal pleura with every respiration. As the structure of this adhesion permitted of its being divided some distance from the chest wall, it was considered that the risk of complications following division was probably not as great as that associated with the constant tugging on the parietal pleura if it were left untouched. The adhesion was consequently divided. Two weeks following operation a serous effusion occurred, this persisted for about six weeks before finally being absorbed. In the case of the remaining patient tubercles were noted at the base of two adhesions which were left untouched. Death, attributed to shock, occurred forty-eight hours after operation, this patient will be fully discussed in the section dealing with shock.

In my series empyema has occurred in 14 patients (6.2 per cent). In the case of eight of these patients tubercle bacilli were recovered from the fluid. In the case of two patients no organism was recovered from the fluid, and in these patients the empyema has been presumed to be of tuberculous origin. In the case of three patients both tubercle bacilli and pyogenic organisms were found. In the case of the remaining patient the empyema was pneumococcal in origin. Bacteriological examination of the fluid has included examination by direct smear and attempted culture both for tubercle bacilli and pyogenic organisms. The periods following operation at which empyema has been noted have been as follows: two weeks, three patients; three weeks, three patients; four weeks, two patients; seven weeks, one patient; eight weeks, three patients; sixteen weeks, two patients.

The status of the 14 patients who developed empyema is as

follows three patients are dead, death having occurred ten months, thirteen months and ten months respectively following operation. In the case of one patient the empyema subsided spontaneously and pneumothorax is being continued. As regards another case, in this patient also spontaneous recovery from the empyema seems likely to occur, and there appears also a reasonable prospect of the pulmonary condition becoming stabilized without further active measures. In the case of one patient, cure of the empyema followed treatment with penicillin and complete expansion of the lung occurred. Two patients have had thoracoplasty performed, and the result in both patients has been satisfactory from the point of view of obliteration of the pleural space and also as regards control of the pulmonary lesion. The prognosis of two patients appears to be hopeless, in neither case could major surgery be contemplated. As regards another case, on present indications the ultimate outlook for this patient also appears to be hopeless. In three cases (one already mentioned), thoracoplasty will probably be necessary.

Of the 14 patients in whom empyema occurred in eight the empyema was preceded by spontaneous pneumothorax.

In studying the patients in whom empyema occurred it is seen that, with one exception, all had extensive adhesions. Naturally the question arises as to the advisability of attempting pneumonolysis in patients in whom extensive adhesions are present. After close study I believe that with my present experience I would probably not have attempted pneumonolysis in the case of four of the patients in whom empyema occurred. I would still regard the remaining ten patients as suitable for pneumonolysis, a large number of patients in my series who have been operated upon without incident and in whom an excellent final result has followed. I have had adhesions of equal or greater complexity than were present in these ten patients. Pleural adhesions are so variable in arrangement and complexity that it is difficult to make fixed rules as regards suitability for operation. As mentioned above, I have become more and more averse to attempting pneumonolysis in cases in which it is necessary to leave an adhesion partly freed. This applies more particularly to the type of adhesion in which one free edge can be defined but in which the other border merges into an area where the lung is adherent to the parietes. This type of adhesion is not infrequently seen in the posterior apical region in cases in which the posterior surface of the apical and subapical portions of the lung is adherent to the chest wall. As regards those adhesions in which both borders can be clearly defined, provided that pneumonolysis is possible at all, I now rarely find more than one operative stage to be required.

for complete freeing to be effected This experience of course has no relation to the case, multiple adhesions being present, in which some adhesions are freed at one operation and the remainder left for a further stage

In assessing the suitability of patients for pneumonolysis, my tendency has been to become more conservative

The treatment of tuberculous empyema has always presented a problem of extreme difficulty In the case of those patients who have still been under my care when the empyema was first noted, treatment has been by repeated aspiration In one case recovery followed, it must be mentioned that in this case tubercle bacilli were never recovered from the pleural fluid, and the diagnosis of tuberculous empyema was presumptive only In one other patient recovery seems likely to take place In another case complete recovery from the empyema occurred as a result of treatment with penicillin, but in this case the empyema was not of tuberculous origin The present position as regards the treatment of tuberculous empyema is that the great majority of patients suffering from this condition ultimately require thoracoplasty to close the pleural space

TABLE IV

Author	No of Patients	Type of Empyema		Total
		Tuberculous	Pyogenic and Mixed Infection	
		Per cent	Per cent	Per cent
Anderson and Alexander	87	4	2	6 ( 7.2)
Brock	302	5	5	10 ( 3.3)
Chandler (1st series)	89	3	4	7 ( 7.8)
Chandler (2nd series)	68	1	0	1 ( 1.4)
Drash	230	6	0	6 ( 2.6)
Edwards and Lynn	226	32		32 (13.5)
Goorwitch (four surgeons)	373			31 ( 8.3)
Goorwitch (collected series)	5,114	(3.5)	(1.4)	( 4.9)
Matson	249	41		41 (16.5)
Newton	148	3		3 ( 2.0)

Matson, in 1934,<sup>19</sup> published an interesting discussion of his 249 cases His first group included 136 cases in which the Jacobaeus technique, with the use of the galvano-cautery, was used, in the second group of 35 cases he used electrosurgery with what he describes as an obsolete high-frequency unit, in the final group of 78 cases he used electrosurgery with a Bovie high-frequency unit

Matson attributes the progressive improvement in his results to the different methods used. However, it may perhaps not unreasonably be suggested that his greater experience of pneumonolysis, apart from the method used, may have played a part.

In the last 100 cases in my series to have pneumonolysis performed, empyema occurred in three cases, two of these cases I would not now consider suitable for pneumonolysis. In the last 75 cases in my series to have pneumonolysis performed, empyema occurred in one case only.

TABLE V  
(Adapted from Matson)

	Jacobaeus's Method		Author's Method			
	Galvano-cautery 138 Cases		Unnamed high-frequency Unit 35 Cases		Bovie high frequency Unit 78 Cases	
	Number	Percentage	Number	Percentage	Number	Percentage
Purulent exudate	36	26.4	4	11.4	2	2.5

*Spontaneous Pneumothorax* Spontaneous pneumothorax has occurred nine times in my series. Eight of these cases have already been mentioned in the discussion of those patients who developed empyema. The remaining patient had several adhesions which I had proposed to free in two stages. The first stage was completed, one adhesion, however, being left partly divided. Convalescence was uneventful until eighteen days following operation, when a refill of air was given. A few hours following this refill spontaneous pneumothorax occurred. The pneumothorax was of the valvular type, and death resulted. The rupture of the lung in the case of this patient was thought to be the result of tearing of the incompletely freed adhesion following the refill of air. This case adds point, I think, to my objection, stated above, to leaving any adhesion partly freed, if this has been done, subsequent refills of air must be given with very great caution, care being exercised that sufficient air is never given to cause the pressure in the pleural cavity at the end of expiration to become positive.

In three of the nine patients in whom spontaneous pneumothorax occurred the rupture of the lung was followed by a persistent broncho-pleural fistula. In one case the fistula appears to have sealed over after being patent for about five months. In one case the fistula remained patent until death occurred ten months later. In the third case, as was noted when discussing the empyema which resulted, the rupture in the lung became sealed over following the original break-through, and indeed spontaneous cure of the empyema seemed to have occurred when,

eighteen months following operation, a second rupture occurred, this rupture has been followed by a persistent broncho-pleural fistula

The seriousness of spontaneous pneumothorax as a complication of pneumonolysis is exceeded only by the occurrence of massive uncontrollable hemorrhage from a major blood vessel. When spontaneous pneumothorax occurs as a complication of pneumonolysis, empyema is almost certain to follow. Few patients suffering from tuberculous empyema recover from the condition with conservative treatment, in the majority, sooner or later thoracoplasty will become necessary, either to obliterate the pleural space or in the case of the few patients in whom expansion of the lung has taken place, to deal with the lesion in the lung for which artificial pneumothorax was originally induced. As regards those patients in whom the empyema is due to an organism of the pyogenic group, uncomplicated by the presence of tubercle bacilli, the discovery of penicillin has greatly improved the prognosis as regards the empyema, however as cure of the empyema entails expansion of the lung, the lesion in the lung remains to be dealt with, and here again thoracoplasty usually must be considered.

In cases in which a persistent broncho-pleural fistula results the prognosis immediately becomes much more serious still. The seriousness of this complication underlines the necessity for reducing its occurrence to a minimum by scrupulous attention to the details of technique, and by judicious selection of patients for operation. The incidence of spontaneous pneumothorax in Goorwitch's<sup>15</sup> collected series is given as 23 per cent and the incidence of broncho-pleural fistula as 25 per cent. Although not absolutely clear, it would appear that none of the patients shown as developing broncho-pleural fistula are included among those recorded as having suffered spontaneous pneumothorax. This would give a total incidence of rupture of the lung of 48 per cent (This percentage is relative to the number of operative stages).

*Pleuro-cutaneous Fistula* Pleuro-cutaneous fistula has occurred in five patients, in all as a complication of empyema. Two of these patients have had thoracoplasty performed, in addition to a generally excellent result from this operation in both patients, in one patient the pleuro-cutaneous fistula has closed, and in the other only a small superficial sinus remains. In each of the other three patients the fistula is still patent.

*Shock* One patient, a female aged thirty-six years, died about forty-eight hours following operation. Death in this case was attributed to shock resulting from the operation.

This patient had had artificial pneumothorax induced on the right side about four years before her death. She came under my

care about two years following the original induction of pneumothorax, the intervening period having been spent in a sanatorium. When she was seen by me her condition was unstable. Pneumothorax was being maintained on the right side and the lesion in the lung on this side appeared to be under control. She had, however, a small lesion in the left apex and tubercle bacilli were recovered on culture of the fasting stomach contents. Her condition remained unchanged for about fifteen months, after which deterioration was apparent in the lesion in the left lung. Progressive deterioration continued to be evident, both in the patient's general condition and in the lesion in the left lung. About two months before her death, although it was realized that she was a very poor subject, it was decided that the only possibility of halting the spread of the disease was to supplement the bed rest she was then having, with artificial pneumothorax therapy on the left side. Pneumothorax consequently was induced, but was ineffective because of adhesions. She was not a good subject for pneumonolysis, and I hesitated before deciding to submit her to operation, the alternative was, however, to abandon the pneumothorax. Two months were allowed to elapse in the hope that she would become accommodated to the pneumothorax, and as at the end of this period the temperature had been normal for several weeks, it was decided to attempt pneumonolysis. Several apical and subapical adhesions, which offered no technical difficulty, were freed. In addition to these adhesions there were two bands in the mid-zone, at the base of which in each case one or two tubercles were seen, on account of the presence of the tubercles these adhesions were, as I decided, unsuitable for operation. There was one further adhesion present at the extreme apex, the freeing of which I thought might give adequate relaxation of the lung. However, in spite of the fact that up to this stage the operation had not been of a severe character, her general condition was not satisfactory. Dyspnea had been present throughout the operation and appeared to be becoming more pronounced. Consequently I decided not to free this adhesion. Following the operation, her general condition did not show any appreciable improvement, and death occurred about forty-eight hours later. Spontaneous pneumothorax did not occur, nor had there been any hemorrhage. Autopsy was performed and revealed widespread millary involvement. Death in this patient was, I believe, caused by shock resulting from the operation in a patient whose general resistance had become greatly lowered by a protracted debilitating illness. In view of the finding at autopsy it is unlikely that, in any case, death would have been delayed beyond a couple of months.

This patient was a borderline case in which to attempt pneu-



monolysis, or even for the induction of pneumothorax, however, the latter procedure having been undertaken, pneumonolysis became a logical outcome unless an absolute contraindication should be present. In actual fact this contraindication did exist, in the form of millary spread, but on the evidence this condition could not be diagnosed before operation.

*Obliterative Pleuritis* A late complication of considerable interest, occurring in patients who have been submitted to pneumonolysis, is obliterative pleuritis. This process, as is well known, is a relatively common mode of termination of artificial pneumothorax. Alexander believes that the condition occurs in artificial pneumothorax more frequently in those patients who have had pneumonolysis performed. Since obliterative pleuritis may become evident at any stage during the period in which artificial pneumothorax is being maintained, it follows that the longer a given series of patients is followed the higher will be the incidence of this condition. The tempo of the obliterative process, once it has commenced, is variable. In some cases the process may reach the stage at which the inferior surface of the lung has become adherent to the diaphragm, after which no advance may occur over a considerable period, in this type of case effective pneumothorax may frequently be continued for a considerable time. On the other hand the advance of the process may be relatively rapid and the pneumothorax space become obliterated within a few weeks. A very important factor in the development of obliterative pleuritis is the occurrence of persistent pleural effusion. In some patients, on the contrary, the condition may gradually develop, although little or no fluid may have been noted in the pleural cavity at any period during the maintenance of the pneumothorax.

In recording the incidence of obliterative pleuritis in a series of patients such as the one under review, it is sometimes difficult to decide to what extent, if any, pneumonolysis has been a factor. However, all patients have been included, at whatever period following operation the condition has become evident, whether the process appears to have become stationary at the stage at which the lower surface of the lung has become adherent to the diaphragm or whether it has been possible for the pneumothorax to be continued or not.

Of the 43 patients in my series on whom thoracoscopic examination only was performed, in the case of one patient obliterative pleuritis became evident about four months following operation. In a relatively high proportion of patients in this group pneumothorax was voluntarily abandoned when it was found impossible to render the collapse effective.

Of the 225 cases in which pneumonolysis was performed, in six,

commencing oblitative pleuritis was evident prior to operation. In two, little advance in the process has taken place and pneumothorax is being continued twenty and twenty-one months respectively subsequent to operation. In one patient the oblitative process showed evidence of progression two months following operation, and four months following operation pneumothorax was abandoned. In one patient, in whom it had been difficult to maintain pneumothorax because of the rapid absorption of air, after about four months the oblitative process was seen to have advanced considerably and the pneumothorax was rapidly lost. In one patient, after four months the oblitative process was noted to be progressing, and eight months following operation pneumothorax was abandoned. In the case of the remaining patient I have been unable to obtain precise information, but the oblitative process appears to have commenced to advance six months following operation and pneumothorax was abandoned a few months later. Of the four cases in which it became necessary to abandon pneumothorax, in two cases postoperative pleural effusion appears to have been a contributing factor in the progress of the oblitative process.

With regard to 219 cases in which no evidence of oblitative pleuritis was noted prior to pneumonolysis, in 28 cases this condition developed at some period subsequent to operation.

Consequently, of 225 cases in which pneumonolysis was carried out, oblitative pleuritis either has occurred, or in cases in which it was present prior to operation has progressed at some period subsequent to operation in a total of 32 cases (14.2 per cent).

In four cases the condition became evident less than three months following operation, in eight cases the period was between three months and six months following operation, in ten cases the period was between six months and twelve months following operation, in five cases the period was over twelve months following operation, in one case the period is uncertain, but it is known that pneumothorax was maintained for thirteen months following operation.

Including the four patients in whom oblitative pleuritis, present before operation, progressed subsequent to operation, in one case it was necessary to abandon pneumothorax less than three months following operation, in three cases the period was between three months and six months, in nine cases the period was between six months and twelve months, in eight cases the period was over twelve months. In eleven cases in which commencing oblitative pleuritis has become evident pneumothorax is still being maintained. In five cases over eighteen months have elapsed since pneumonolysis, in four cases between twelve months and eighteen

months have elapsed, in two cases six months and seven months respectively have elapsed

In a number of the patients in whom oblitative pleuritis has become evident at some period following pneumonolysis, the maintenance of pneumothorax following operation has been of sufficiently long duration for the closure of cavities to have been effected. Of the 32 patients in whom oblitative pleuritis became evident subsequent to pneumonolysis, or in whom a previously existing oblitative pleuritis progressed following pneumonolysis, in 17 cases the occurrence of pleural effusion seems to have been a factor in originating the process, or in causing the process to advance in those cases in which it was evident prior to operation. In 12 cases the effusion occurred in the postoperative period, here considered as the period of two months subsequent to operation. In five cases a varying period elapsed from the time of operation to the occurrence of the effusion.

In Goorwitch's<sup>15</sup> collected series the occurrence of oblitative pleuritis is estimated at 7 per cent. However, in another paper by the same author,<sup>14</sup> in which he discusses the complications which occurred following closed intrapleural pneumonolysis, carried out on 373 lungs by four surgeons, who operated at the one sanatorium, the incidence of oblitative pleuritis is shown as 85 cases (22.7 per cent). In the latter group of patients, Goorwitch appears to have had better facilities for arriving at an accurate assessment of this complication than in his larger collected series, with regard to which, in the case of a number of authors whose records were consulted, complete data seem to have been lacking. It is probable that the incidence of oblitative pleuritis in the larger series would have been greater than 7 per cent were complete records available.

*Surgical Emphysema* Surgical emphysema in some degree has been of frequent occurrence in my patients following operation. Tightly applied strapping over a built-up pad of gauze has lessened the degree of emphysema, but except in a few cases has not been completely effective in preventing its occurrence. In a few patients in whom cough has been severe, extensive emphysema has occurred in two patients extending upwards to the face and into the loose tissues around the eyes, and in one patient extending downward as far as the scrotum. Emphysema in the very great majority of patients, even in those in whom extensive emphysema occurs, is to be regarded as a temporary annoyance only.

In the case of two patients in my series expansion of the lung with loss of the pneumothorax space has occurred. In the first patient partial pneumonolysis only was done. In the case of the second patient extensive pneumonolysis had been carried out and

the lung had been completely freed, however, expansion of the lung occurred, and although it was possible to recollapse the lower zone it was found impossible to recollapse the upper lobe.

The usual explanation of this occurrence is that air escapes from the pleural cavity through the holes made by the trocar, and that the lung expands and becomes adherent to the chest wall. That this is the complete explanation was questioned by Brantigan, Hoffman and Proctor,<sup>4</sup> writing in 1942. These authors reported loss of the pneumothorax space in four patients, following closed pneumonolysis. Fluoroscopic examination had been carried out three hours following operation, when almost complete re-expansion was present. Refills of air were given and repeated in four hours. However, the following day, in one patient complete re-expansion was present and in the other three patients complete expansion of upper and middle lobes had occurred, although partial collapse of the lower lobe was present. Brantigan, Hoffman and Proctor do not believe that excessive leakage of air, *per se*, is the cause of re-expansion of the lung in this type of case. They believe that the presence of endo-bronchial tuberculosis in the main stem bronchus, at the orifice of the branch bronchus, or within the lumen of the branch bronchus, explains the rapid loss of air from the pleural cavity. Following pneumonolysis, there is immediate improved collapse of the lung, accompanied in some cases by kinking of the bronchus. When kinking occurs in those patients in whom endo-bronchial disease is present, obstruction of the bronchus may follow. If the obstruction is complete, atelectasis of the complete lung, or of one lobe, will follow, depending on whether the main stem bronchus or a branch bronchus is involved. However, in cases in which the obstruction is incomplete a check valve action may be initiated. Air passes the obstruction in the bronchus during inspiration, but with the narrowing of the lumen of the bronchus during expiration air remains trapped in the lung distal to the blockage. This mechanism operates with every act of respiration. Rapid expansion of the lung beyond the obstruction consequently occurs. In such cases, then, the re-expanding lung forces air out of the pleural cavity into the tissues, and the concomitant emphysema is thus to be regarded as the result of this re-expansion, and not as its cause. In the four patients reported by Brantigan, Hoffman and Proctor, endo-bronchial disease was later demonstrated.

It has always been difficult for me to understand, in cases of loss of pneumothorax space following pneumonolysis, how adherence between the lung and chest wall occurs so rapidly. I believe that the theory put forward by Brantigan, Hoffman and Proctor offers a satisfactory explanation of what happens in these

patients Unfortunately, bronchoscopic examination was not carried out in the case of my two patients

Anderson and Alexander<sup>1</sup> report losing the pneumothorax space once in their 87 patients, of Moore's<sup>20</sup> collected series of 2,043 cases, in six cases the pneumothorax space was lost, and of Drash's<sup>10</sup> 230 cases, in one the pneumothorax was lost In Goorwitch's<sup>15</sup> collected series of 5,114 cases the incidence of loss of pneumothorax space is given as 3 per cent

*Postoperative Vomiting* Postoperative vomiting has occurred in a number of patients The possibility that the premedication might have had some bearing was considered—morphine and hyoscine were being used at the time, consequently in the case of two patients who were temperamentally suitable, premedication was dispensed with In one of these patients moderately severe postoperative vomiting occurred This complication has been noted by Brock,<sup>5</sup> who considers it the result of the manipulation of the pleura and subplueral tissues at operation

*Dyspnea During Operation* Dyspnea during operation was complained of by three patients, in two of whom contralateral pneumothorax was being maintained at the time of operation In two of these cases it was possible to complete the operation, uneventful convalescence following in both cases In the third case several adhesions were freed, but the operation could not be completed This patient has already been discussed in the section dealing with shock Brock<sup>5</sup> reports that in three cases he found it necessary to stop the operation because of this complication and in one case was compelled to abandon the operation completely In addition to the three patients mentioned, there have been two or three others in whom a minor degree of dyspnea was present during operation The importance of the dyspnea in the case of these patients was that on account of the large respiratory excursion the operation was rendered much more difficult, in such a patient if an adhesion to be cauterized were situated in a dangerous position, it might be necessary to abandon cauterization because of the hazard

*Injury to Nerves* Several patients have complained of numbness of the arm and forearm following operation This usually passes off during the course of a few weeks In one patient, while an adhesion was being enucleated the second intercostal nerve was seen and recognized, in this case a little numbness occurred in the upper part of the arm in the distribution of the second dorsal nerve, and tenderness on pressure could be elicited in the second intercostal space anteriorly This tenderness gradually passed off In one patient in whom extensive "peeling off" of the apex from the posterior portion of the chest wall was carried out, signs of

Horner's syndrome were noted immediately following operation, eighteen months later a little inequality of the pupils was still present in this patient

An interesting complication occurred in one female patient in whom three apical bands had been freed. Immediately after operation she noticed that the hand on the same side as that on which pneumonolysis had been performed was warmer than the other. No other objective or subjective sign was present. This sign has persisted up to the time of writing, about six months following operation.

Alexander<sup>2</sup> has noted, in discussing nerve injuries following pneumonolysis, that in one of Saugman's patients paralysis of one-half of the diaphragm followed divisions of an adhesion in the medial part of the chest.

### DISCUSSION

From the accumulated experience of many clinics in Europe and America, particularly during the past ten to fifteen years, the value of closed intrapleural pneumonolysis has been abundantly proven. With the aid of pneumonolysis, a useless and dangerous pneumothorax may frequently be rendered effective, with resultant satisfactory relaxation of the lung and, in many cases, closure of cavities and ultimate control of the lesion. Frequently, the patient is saved the necessity of undergoing an extensive plastic operation, which otherwise might be required to save life. In the case of patients in whom active contralateral disease is present, successful pneumonolysis may offer the only prospect of planning a program of treatment which gives to the patient any chance of survival.

The operation is one never to be regarded lightly by the surgeon. A complete knowledge of the pathology of pulmonary tuberculosis is essential, and the structure and mode of formation of pleural adhesions must be fully understood if a requisite technique is to be acquired by the surgeon. Alexander,<sup>2</sup> himself having a wholesome respect for the potential difficulties of the operation, takes to task a surgeon who said that, "the technique of cauterization of adhesions, by the Jacobaeus-Unverricht method is simple and free from danger." Alexander's comment is that neither Jacobaeus nor Unverricht held that view. The technical difficulties in the case of the more complex adhesions may be very great indeed. Nevertheless if the operator is experienced, the incidence of serious complications should not be high, and in the case of the more simple adhesions should be relatively rare. Of the 96 patients in my series to have pneumonolysis performed, in whom were present adhesions of the order included in grades I and II

as described above, only one patient suffered any serious complication. With regard to thorascopic examination alone, the risk of complication occurring in patients submitted to this procedure should be very small indeed.

### SUMMARY

The procedure of closed intrapleural pneumonolysis has been discussed. The results in a series of patients submitted to operation are reported and the postoperative complications are reviewed.

### RESUMEN

Se ha discutido el procedimiento de la neumonolisis intrapleural cerrada. Se comunican los resultados obtenidos en una serie de enfermos sometidos a la operación y se analizan las complicaciones postoperatorias.

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# The Eradication of Tuberculosis, the Greatest Health Problem in the Philippines

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Tuberculosis is the most dreadful disease in the Philippines because of the very high mortality among our countrymen with devastating effects on the economic and social conditions. Consider the tens of thousands of human lives that succumb yearly to the disease and you will wonder how the Filipino people can survive in the long run. The total number of deaths due to tuberculosis in 1936 amounted to 32,235 which is almost equal to the combined total mortality from five of the most prevalent diseases in the Philippines, such as malaria, influenza, beri-beri, dysentery, and typhoid which, in the same year, caused 35,955 deaths. The latest report from the Health Service shows that the death rate of tuberculosis has increased during the last war to 35,000 deaths per year. In other words *one* Filipino died of tuberculosis in the Philippines every fifteen minutes.

Hundreds of thousands of our countrymen are suffering from active tuberculosis and as such we may consider them as non-productive elements in the community. From the economic standpoint the estimated losses are as follows: For every death, P 1,000 00, for loss in production, P 600 00, for cost of treatment and food, P 365 00, and for funeral expenses, P 20 00. The thirty-five thousand (35,000) deaths from tuberculosis represent therefore, an economic loss of 69,475,000 pesos per year. Assuming, from the epidemiological and statistical point of view, that for every death from tuberculosis there are in existence 12 cases with active process, then, it can be considered that approximately 420,000 Filipinos are actually suffering from the disease. These cases are the ones responsible for the continuous spread of infection and dissemination of tuberculosis to the rest of the population. For these 420,000 tuberculous patients, evaluating each patient becoming a non-productive element at P 600 00 per year, and the cost of treatment and food, P 365 00 per year, then the total loss amounts to 405,000,000 pesos annually. The total economic loss for those 35,000 deaths and for the 420,000 tuberculous patients is therefore 69,475,000 and 405,300,000 pesos, respectively.

A comparison of the mortality in the Philippines with that in other countries such as the United States, England and Germany

United States of America	(1929)	90,000
"	(1940)	60,000
England	(1927)	38,173
"	(1937)	35,000
Germany	(1927)	61 408
"	(1936)	57,000
Philippines (18,000,000)	(1930)	33,000
"	(1940)	35,000

### CAUSES OF THE PREVALENCE OF PULMONARY TUBERCULOSIS AMONG THE FILIPINOS

The disease is a very old one in our country. It was mentioned by Spanish writers since 1521. Some methods of cure were recommended then, betraying ignorance of the real cause of the disease. Although American administration in the Philippines was organized in 1901 and the Department of Health began its work the following year, its activities were directed and limited to the control of the prevailing diseases at that time, namely, bubonic plague, cholera, dysentery, small-pox, etc.

The first measure against tuberculosis was started on June 30, 1908, when the Municipal Board of Manila enacted Municipal Ordinance 104, Section 928, now amended as Section 208 of Municipal Ordinance 285, prohibiting expectoration in public places. It can be asserted that during the Spanish regimen and during the early years of American occupation forty years ago, almost nothing had been done effectively to control or to eradicate tuberculosis among our countrymen. It spreads everywhere and in every place so that there is hardly any Filipino home today that has not been visited by the ghost of tuberculosis.

Among the most outstanding predisposing causes or conditions which favor the transmission of the disease from one person to another are the following:

*Ignorance and lack of sanitary and hygienic education.* The majority of the Filipinos are still completely ignorant about the origin, causes, and means of infection of tuberculosis. Although hygiene and sanitation are taught to our children in the public and private schools, in the homes their parents are reluctant to apply the preventive measures taught in the schools. The traditional Filipino customs of taking care of tuberculous patients (living in the same room, using the same utensils in eating, spitting anywhere, etc.) remain unchanged. Thus, the contagion is general, particularly to the infants who are very susceptible to infection. More and more persistent educational campaigns should be carried out among our people in order to achieve fruitful results.

*Poverty* Tuberculosis is more rampant among the poorer classes, especially the laborers. This was generally observed among those who exert great physical efforts in their work or who spend more energy in the performance of their duties, such as the laborers and workers in the commercial and industrial firms. Poverty means undernourishment, poor housing, overcrowding, excessive work, moral depression and lack of resistance.

*Economics* If we consider the daily wages of our laborers which average P 5 00 in the City of Manila and P 4 00 in the provinces, and compare these with the actual cost of living, particularly during these post war days, we can easily understand that the income of our laborers is hardly sufficient to enable them to maintain a normal standard of living. The laborers or the poor class are more prolific than those belonging to the middle class. The average components of a family are 5 to 6 members. Quarters in the slum district of the City of Manila costs ordinarily P 0 50 daily for the whole family, and food, including rice, costs from 2 00 to 3 00 pesos. There is nothing left for clothing and medicine even for slight ailments. In a case where there is one sick of tuberculosis in a family, overcrowding and promiscuous sleeping result in contagion for the whole family.

*Undernourishment* The insufficient intake of food or the lack of a balanced diet in the daily life of our people causes low body weight, weak constitution and great susceptibility to the disease.

Filipinos are easy victims of tuberculosis. They are dying of tuberculosis because they are undernourished, they are undernourished because they are poor, and they are poor because they are not receiving enough income for a standard mode of living. Our natural resources are still undeveloped.

*Social conditions* Poverty and economy are social problems. Unless our resources, agricultural and industrial, are developed by the Government, the condition of poverty and poor economy in the country cannot be improved and settled. There is a need to overhaul the primitive system of cultivation of our land to increase the yield of the soil for the benefit of the laborers in the fields. For example, rice production in the Philippines gives an average of 30 cavanes per hectare. This can be doubled or tripled by employing a mechanical plow which digs deeper into the soil, the use of fertilizers to increase the yield, the use of automatic grain drills instead of the primitive way of seed planting by hand, the proper selection of seeds for planting, etc. With the increase in crop production, there will naturally be an increase in the share of the tenant.

Industry can be aided also by the Government by transforming water power in Luzon and Mindanao into hydro-electric plants.

which may produce cheap electricity for the creation of home industries. The problem of tuberculosis control is not only medical but also economic and social.

*Previous Diseases* All factors that may cause weakness of the body or previous illnesses, such as malaria, influenza, pneumonia, diabetes, intestinal parasitism, etc., which lower the body resistance, contribute to the rapid development of the disease.

*War conditions* The increase of the incidence and its high mortality during the three years of Japanese occupation, which up to the present time prevail, may be attributed to lack of food or undernourishment, to worries and its side effects on the nervous system, and to the hardships of life created by the Japanese brutality and atrocity during the whole period of occupation. The above opinion can be deduced from the following tables.

TABLE I—BEFORE JAPANESE OCCUPATION

Year	No of Examinations	Total No Positive Cases	Rate per 100
1939	262,804	16,652	6,336
1940	261,143	15,294	5,857
1941	175,701	10,858	6,180
TOTAL	699,648	42,804	6,118

TABLE II—DURING JAPANESE OCCUPATION

Year	No of Examinations	Total No Positive Cases	Rate per 100
1942	27,312	4,418	16,176
1943	45,113	7,419	16,455
1944	29,581	5,948	20,108
TOTAL	102,006	17,785	17,435

## CAMPAIGN AGAINST TUBERCULOSIS IN THE PHILIPPINES

The Bureau of Health and the Philippine Tuberculosis Society are the Government and semi-government enterprises, respectively, that carry out all the activities to control and eradicate tuberculosis in the Philippines. The latter started the campaign against the disease since its organization in 1910 with the opening of the San Juan del Monte Sanatorium near Manila. Since that time, year after year, the Society included among its activities the establishment of pavilions and dispensaries provided with x-ray facilities, laboratory and pneumothorax equipment in Manila and in the provinces. Early diagnosis of the disease and proper treat-

ment were given to tuberculous patients Education and propaganda to the public about tuberculosis were not overlooked by the physicians and nurses in charge of the sanatoria, pavilions and dispensaries

In 1937, the main building of the Quezon Institute (formerly the Santol Tuberculosis Sanatorium) was erected, and in 1941 the wings of the Institute were completed fully equipped with the latest x-ray apparatus and tomography, modern laboratory equipment with facilities for research work, air-conditioned operating room, surgical and eye, ear, nose, throat, and physiotherapy clinic, orthopedic clinic, morgue equipped and electrically operated refrigerator, incinerator, etc The Quezon Institute is a modern up-to-date sanatorium in the Orient whose buildings and pavilions were patterned after the most modern system of hospital construction in the United States Its capacity was for more than 1,300 beds The Quezon Institute became famous through its medical director, Dr Miguel Canizares, whose leadership as anti-tuberculosis campaigner is duly recognized in the Philippines and abroad

The Philippine Tuberculosis Society also established sanatoria in the cities of Ilo-Ilo, Cebu, and Baguio, pavilions and dispensaries in the capitals of various provinces such as in Zamboanga, Capiz, Tacloban, Vigan, Tuguegarao, Naga, Cabanatuan and Calamba The fundamental policies of the Society carried out in all the corners of the country were as follows

- (a) To inform the public about the modes of infection of the disease and the methods of prevention
- (b) To combat the spread of the disease and to afford the necessary relief to afflicted persons with all available means

The outstanding work undertaken by the Quezon Institute were as follows (1) training private physicians and fellows of the Bureau of Health in the diagnosis, treatment and prevention of the disease, (2) teaching and acquainting the undergraduate interns of the three medical colleges of the country with the various phases of tuberculosis, stressing principally the important role that they as future practitioners must play in the control of tuberculosis, (3) treating, educating, training, and rehabilitating tuberculous patients for the new life after they have been discharged, (4) induction of collapse therapy in suitable cases, and (5) conducting research and investigations on tuberculosis

The Society also offered the Out-Patient Service, Dispensary Service, and Home Treatment Service which rendered invaluable benefits to the suffering patients of tuberculosis

*Out-Patient Service* The services were rendered to poor people who could not afford the payment of private physicians, especially when there is a need of a thorough examination of the chest by

x-ray for tuberculosis and other diseases It also furnished information and assistance in securing sanatorium care for any person suffering from the disease

*Dispensary Service* Day and night, free service to indigent patients was also opened to the public Dispensary service was especially offered to laborers who had no time to attend the consultations during the day The dispensaries were strategically located in various districts in the City of Manila and in several provinces to help the poor people who could not afford to pay private physicians This service provided for periodic health examination including free treatment of the disease The services rendered by the dispensary in close cooperation with the outpatient service, stressed the value of periodic health examinations and early diagnosis with proper medical care

*Home Treatment Service* This service proved to be also a public need because of the ever-increasing tuberculous patients who attended the dispensaries in Manila and provinces, most of them requiring hospitalization but no accommodation was available These poor patients then were provided with an expert and competent medical service and nursing follow-up attendance The education provided by the home treatment service in matters of prevention and control is also very beneficial to the people

### PHILIPPINE TUBERCULOSIS COMMISSION

The Government of the Philippines began the control of the disease on November 24, 1930, when it created the Philippine Tuberculosis Commission by virtue of Act No 3743 This commission functioned from February 16, 1931, to December 31, 1932 In 1933, a reorganization act was approved, transferring the functions of the Philippine Tuberculosis Commission to the Bureau of Health A section of the said Bureau now called the Tuberculosis Control Section is in charge of all activities concerning this disease The campaign against tuberculosis conducted by the Bureau of Health, Bureau of Education, community assemblies, and the community social centers The school children were reached through the school teachers, nurses, and physicians, the adult population through lectures, conferences, and radio talks from time to time by physicians, nurses, social workers, and health specialists The health agencies gradually extended to rural districts through tuberculosis clinics

*Diagnosis* The case finding was done by traveling x-ray units which conducted fluoroscopic examinations, and by health officers in various clinics and dispensaries in the provinces Private practitioners rendered valuable services cooperating with the Government in this respect

*Relief and Treatment* The San Lazaro Hospital, Manila, with a 200 bed capacity under the Bureau of Health also gave admission to tuberculous patients of the moderate and far advanced cases There were also cottages for tuberculous patients in Bagulo and several pavilions and dispensaries in the provinces

Lastly, physicians and nurses undertook follow-up work through home visits At the same time health officers rendered remedial services to the sick whenever these measures were available and needed

*Tuberculosis Research* Tuberculosis investigations were accomplished by three sections, namely, (1) bacteriological laboratory, (2) pathological laboratory, and (3) section of routine sputum examination

The benefits of the services rendered by the Philippine Tuberculosis Society and the Bureau of Health through their agencies cannot be underestimated as they undoubtedly contributed to the prevention, control and treatment of tuberculous patients Much had been done, but much more remains to be done

### THREE YEARS OF INACTIVITIES

Due to the prevailing unfavorable conditions during the three years of Japanese occupation, the activities of the Philippine Tuberculosis Society and the Bureau of Health were curtailed The Quezon Institute was occupied by the armed forces of the Japanese, while its personnel and part of the equipment was transferred to San Juan de Dios Hospital, located in the Walled City in Manila The hospital had 400 beds There were also eleven other tuberculosis pavilions and dispensaries operated throughout the Islands The said hospital was an old building, not proper to accommodate tuberculous patients The tuberculosis cottages of the Bureau of Health in Bagulo and several pavilions and dispensaries in the provinces were also adversely affected in their functions

Incidence and mortality due to tuberculosis having been reduced in the previous years prior to the outbreak of the war have shown again an increase According to a recent report from the Health Service, Manila, the death rate of tuberculosis reached to 830 for every 100,000 persons as against 230 before the war

### P 1,000,000 FOR TUBERCULOSIS DRIVE

After the liberation of the Philippines by the American Armed Forces, President Sergio Osmena of the Philippine Commonwealth Government approved the H B No 543 providing for the appropriation of 1,000,000 pesos for the rehabilitation of the Philippine Tuberculosis Society to enable this organization to operate again

the Quezon Institute and other agencies engaged in the fight against tuberculosis

Wider and more extensive tuberculosis campaigns throughout the Philippines are badly needed because of the great mortality of our people due to tuberculosis as a sequel to the war. To a great evil, a great remedy is needed.

### CREATION OF THE NATIONAL COUNCIL FOR TUBERCULOSIS CONTROL

In view of the extent and magnitude of the tuberculosis problem in the Philippines, there is a national call for unification and consolidation of efforts of the various entities working for the prevention and control of the disease. The inconvenience of multiple directorates, overlapping of work, lack of coordination, misunderstanding, and waste of money should be avoided.

I believe that to achieve better results in our campaign against tuberculosis, the creation by the Philippine Congress of a central organization which will synchronize or embody the functions of various tuberculosis institutions such as the Philippine Tuberculosis Society, the Bureau of Health, and the White Cross is necessary. This organization may be called "The National Council for Tuberculosis Control."

### ORGANIZATION

It should be composed of a full-time medical director, a specialist as phthisiologist, another phthisiologist as executive officer and secretary, and a board of directors composed of the president of the Philippine Tuberculosis Society, ex-officio, the director of the Bureau of Health, ex-officio, the President of the Philippine Medical Association, the president of the Private Practitioners Association, a representative of the Social Workers Association, and a representative of agricultural, commercial, and industrial enterprises. This national organization should draft a program for *Ten Years' Activities* under a coordinated plan of campaign against the disease, and for this purpose *Five Sections* to carry out the following activities should be created:

- 1 Section on education and propaganda
- 2 Section on epidemiology and statistics
- 3 Section on hospitals, sanatoria, pavilions and dispensaries
- 4 Section on rehabilitation and social services
- 5 Section on research and investigation

*Section of Education and Propaganda* Information about tuberculosis should reach all vital elements of the community and no person or group of persons must be left unapproached. These include the following:



- (a) Schools, colleges, and universities
- (b) Government offices, agencies and other entitles
- (c) Association of all kinds, medical and nursing, dental, fraternal, cultural, etc
- (d) Clubs women, civic, sporting, social, etc
- (e) Agricultural, industrial and commercial organizations
- (f) Newspapers

Not only information about tuberculosis should be given to the above mentioned groups, but also aid and help should be furnished

*Section on Epidemiology and Statistics* The personnel of the Bureau of Health may be requested to do this work, namely, to furnish the Council all data concerning this matter

*Section on hospitals, sanatoria, pavilions and dispensaries* The diagnosis and treatment of tuberculous patients should be done by the Philippine Tuberculosis Society through its agencies, namely, the Quezon Institute, the Central Dispensary in Manila, and the Sanatoria, pavilions and dispensaries in the provinces including mobile x-ray units

The San Lazaro Hospital for tuberculous patients in Manila, pavilions and dispensaries including their mobile x-ray units with pneumothorax clinics, now under the Bureau of Health, with their personnel should be transferred to the Philippine Tuberculosis Society This organization should undertake the mass survey of (1) all contacts to known cases of tuberculosis, (2) persons suspected of suffering from tuberculosis, under professional treatment of private physicians, and (3) all persons living in certain districts where mortality is known to be excessively high

The establishment of more sanatoria, pavilions and dispensaries to accommodate patients who need confinement in such institutions for treatment must be encouraged

### WHITE CROSS

The only preventoria established in Manila by the White Cross should take care of the children of tuberculous patients

*Rehabilitation and Social Services* The economic and social rehabilitation of tuberculous patients should be given serious consideration by the authorities concerned Official agencies have underestimated the importance of rehabilitation but it is useless to spend thousands of pesos for treatment of tuberculous cases if upon discharge from sanatorium, tuberculous patients suffer relapse because of the reactivation of their previous disease

No person can remain physically fit if he is not economically rehabilitated to enable him to select the kind of work suitable to his condition When a tuberculous patient is maladjusted economically to the environment, he remains a potential danger in spread-

ing the infection to his family and the community at large

In most cases a poor tuberculous patient who needs confinement in a sanatorium cannot stay for complete treatment unless his dependents are provided with some aid from the government or from charitable institutions. The patient will prefer to remain outside of the sanatorium without chance of cure, for fear of leaving his dependents unprovided for.

The insurance of the laborers for their protection in case of sickness should be studied carefully by the Government in relation to this social problem.

*Research and Investigation* The following should be undertaken: scientific research on tuberculosis immunization, the study of native medicinal plants for possible therapeutic application, nutrition of tuberculous patients, application of chemotherapy and antibiotics, social rehabilitation of cured patients, etc.

### FUNDS

To finance the ten year project of activities of the National Council for Tuberculosis Control, once created by the Philippine Congress, the Government should set aside a revolving fund of thirty million pesos (P 30,000,000) as a general fund to be deposited at the National Treasury, one-tenth (P 3,000,000) of which may be spent yearly. The total amount may be covered from the General National Funds and partly from public contributions, and from the proceeds of the Philippine Charity Sweepstakes. All subsidy or aid to the Philippine Tuberculosis Society, its agencies, to the White Cross and others, should be passed and approved by the Board of the National Council of Tuberculosis Control.

Tuberculosis causes thirty five thousand deaths and four hundred seventy four million pesos loss to our economy per year. Its eradication remains a national problem of the Philippines after Independence Day on July 4, 1946. So, to save our country from the catastrophe, the Filipino people should be united in the fight against tuberculosis in all corners of the Philippines.

### SUMMARY

1 Tuberculosis is the most dreadful disease in the Philippines because of the very high mortality among our countrymen, with devastating effects on our economic and social conditions.

2 The *thirty-five thousand* (35,000) deaths from tuberculosis during the war represent an economic loss of *sixty nine million and four hundred seventy five thousand pesos* (P 69,475,000) per year, and the 420,000 Filipinos actually sick of tuberculosis represent an economic loss of another *four hundred five million and three hundred thousand pesos* (P 405,300,000) yearly.

3 The causes of the prevalence of pulmonary tuberculosis among the Filipinos are (1) Ignorance and lack of hygiene and sanitation, (2) poverty, (3) poor economy, (4) undernourishment, (5) social conditions, (6) previous diseases, and (7) post-war conditions

4 The campaign against tuberculosis has been undertaken by the Philippine Tuberculosis Society and the Bureau and their agencies. They established hospitals, sanatoria, pavilions and dispensaries throughout the Islands and the outstanding phases of their activities were educational, diagnostic, relief, treatment, research and investigations

5 The prevailing conditions during the three years of Japanese occupation caused an increase of incidence and mortality of tuberculosis due to lack of food or undernourishment, worries and their side effects on the nervous system, hardships in life created by the Japanese brutalities and atrocities, and inadequate medical attendance

6 There is need of a national call for unification and consolidation of efforts of the various entities working for the prevention and control of the disease. The inconvenience of multiple directorates, overlapping of work, lack of coordination, misunderstanding, and waste of expenditures should be avoided

7 The creation of the *National Council for Tuberculosis Control in the Philippines* is proposed

8 The eradication of tuberculosis in the Philippines as a national problem after Independence on July 4, 1946, calls for the unification of the Filipino people to fight this disease in all corners of the Philippines

## RESUMEN

1 La tuberculosis es una terrible enfermedad causante de una gran mortalidad entre los Filipinos con grave daño de su condición económico-social

2 Las *treinta y cinco mil muertes (35,000)* causadas por la tuberculosis durante la guerra, representan una pérdida económica para el país de *sesenta y nueve millones cuatrocientos setenta y cinco mil pesos (P 69,475,000)* por año, y los 420,000 enfermos actuales de tuberculosis, representan otra pérdida económica de *cuatrocientos cinco millones trescientos mil pesos* anualmente (P 405,300,000)

3 Las causas de la prevalencia de la tuberculosis pulmonar entre los Filipinos son (1) Ignorancia y falta de Higiene y Sanitación, (2) Pobreza, (3) Economía limitada, (4) Nutrición deficiente, (5) Condición social, (6) Enfermedades anteriores, y (7) Condiciones de la post-guerra

4 La campaña antituberculosa en Filipinas ha sido llevada a cabo por la Philippine Tuberculosis Society y el Bureau de Sanidad y sus agencias hasta ahora. Se han establecido Hospitales, Sanatorios, Pabellones y Dispensarios antituberculosos en todo el archipiélago y sus actividades se han extendido en la educación, diagnóstico, tratamiento y en investigaciones sobre tuberculosis.

5 Las condiciones reinantes durante los tres años de ocupación japonesa causaron incremento en la incidencia y mortalidad de la tuberculosis, debido a la escasez de alimentos, depresión moral, dificultades y sufrimientos de los Filipinos por las brutalidades y atrocidades de los japoneses y falta de asistencia médica a nuestros enfermos.

6 Por necesidad nacional deberán unificarse y consolidarse todos los esfuerzos de las varias entidades dedicadas a la prevención y control de la tuberculosis. Las inconveniencias de una dirección múltiple, la duplicidad en los trabajos, falta de coordinación, mala inteligencia y gastos superfluos se evitarán en lo futuro.

7 La creación del *National Council for Tuberculosis Control* en Filipinas es su remedio.

8 La erradicación de la Tuberculosis en Filipinas es un problema nacional después de su Independencia en el 4 de Julio de 1946, y este acontecimiento es un llamamiento para que todos los Filipinos se unan en la lucha contra la tuberculosis que deberá entablarse en todos los rincones del país.

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  - 3 "Annual Report of the Philippine Tuberculosis Society," 1938
  - 4 "Annual and Calendar Report of the Philippine Tuberculosis Society from January 1, 1939 to December 31, 1939 and from January 1, 1940 to June 30, 1940"
  - 5 "A Pamphlet about Tuberculosis prepared by Dr. Jose Guidote, Director of the Bureau of Health," Manila, 1945
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# The Need for Tuberculosis Committees in County Medical Societies\*

HOWARD E SMITH, M.D., F.C.C.P.\*\*

*Austin, Texas*

I have been requested to present some of the arguments for the appointment of a Tuberculosis Committee in each County Medical Society. In a general sense I cannot think of any disadvantages of a committee of this type unless it be that in certain counties, particularly some of those in the Texas Panhandle that the tuberculosis problem be so small as to provide no functions for the committee. Therefore it would be obvious that my recommendations will be entirely for these committees.

The tuberculosis problem in Texas is a major one and in many sections of the State it will surmount all other health problems in the community. The problem will vary from county to county and necessarily control measures should be operated in an uneven manner. Special emphasis should be given those areas where the disease, tuberculosis, has an unusual incidence. In general, the county tuberculosis committee should act in a liaison capacity between all official and non official agencies interested in tuberculosis control and the local county medical society. The need for an official committee has been brought to my attention today in the following manner. In a certain county of the State the local school board in one of the towns has passed a measure requiring the tuberculin testing of all school children in the public school system. The rule passed by the local board seems quite dogmatic in that it requires a physician's certificate, on each individual found to have evidence of tuberculosis, stating that the individual is not infectious before the pupil will be readmitted to the public school. It would seem to me that if this local school board were contemplating passing such a regulation in the school system and if a committee on tuberculosis were present in the local county medical society, the committee could have been requested by the school board to meet with them and discuss the various angles to this type of medical program. The testing program was made mandatory. It should not be mandatory unless facilities are present to provide the proper examination, including an x-ray of the

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\*Read before the Texas Chapter, American College of Chest Physicians, State Medical Association of Texas, Dallas, May 5, 1947

\*\*Director, Tuberculosis Control, State Health Department, Austin, Texas

positive reactors even though they are unable to pay for the examination. Otherwise the regulation is unfair. The school board is to be commended for recognizing the need for a tuberculosis program but from the type of regulation passed it would seem that there was inadequate understanding of the meaning and significance of the tuberculin test and the means necessary to determine if the child is infectious. In my experience few children in such a program will be found to be of any danger to the contacts. As a result, if complete examinations are not available, all that can be determined from the testing program is the incidence of positive reactors in the community. No worthwhile information for a control program will be obtained. The by-products of this type of unsatisfactory control program usually result in confusion of the people, especially the parents, and unnecessary time consumed by the local physicians in explaining the significance of the test. In some communities this type of poorly planned program has resulted in absolute resistance to future bonafide and well planned programs and has delayed a satisfactory program for months or even years in some areas. Thus, there is definite need in my opinion for local committees familiar with tuberculosis that are in a position to offer medical advice and leadership on medical programs where the initiative is taken by lay groups.

A local county medical society tuberculosis committee can provide a service to its own profession. At the present time with the stimulation of tuberculosis control programs by official and non official agencies of the State many counties desire these case finding services, yet in instances to my knowledge the case finding program involving mass surveys of large segments of the population has been broached before the county medical society and voted down through the lack of understanding of the program or the benefits that would accrue to the local physicians and this is especially true of financial gain. At the meeting of the society a discussion takes place and usually some physician with the best of intentions objects on the basis that it leads to State medicine. A motion is made before the society objecting to the program. It will be seconded by a member and a needed program of this type may be deferred or delayed months where there is an acute need for it at the earliest opportunity. If a local committee were present and was familiar with the policies of operations together with the plan in the discussion of the contemplated program the remainder of the society members present would see the advantages, the needs pointed out, and the reasons why no objection should be present. No society, to my knowledge has ever objected to a properly planned program of tuberculosis control where the facts and information were available to them. The only criticism that

appears is that from the lack of knowledge of the suggested control program

A tuberculosis committee of a county medical society might well operate in an additional capacity, to stimulate interest in the local tuberculosis problem and directly or indirectly to provide for discussions and talks involving the phases of education, diagnosis, treatment and hospitalization of the disease. Since any tuberculosis program must eventually operate on the local level and the family physician must assume some responsibility for the care of the patient at some time during the course of the disease, the local physician becomes an important factor in any tuberculosis control movement. If the patient's physician has no interest in the disease and has not followed the developments in the medical and surgical treatments that have evolved in the last decade, the patient loses interest in the physician and feels that in some instances he is without guidance. With the demonstration of interest in the disease and in the patient, the patient will usually have confidence in his physician and with a little encouragement follow the directions and care suggested by the physician.

Through a study of the problem by the tuberculosis committee the needs of the community can be better planned and coordinated. Texas at this time has an acute shortage of sanatorium beds for the treatment of tuberculosis. It thus becomes mandatory that many cases be treated on the local level and as ambulatory cases. Until the bed shortage is reduced or eliminated and as long as this condition exists there will be need for local tuberculosis clinics. There are a number of counties in the State of Texas where no physician is available for example, to provide pneumothorax refills for the patients. This is a handicap to the treatment regime operated in the State Sanatoria because the medical staff cannot initiate the pneumothorax if at the time the patient leaves the sanatorium it will not be possible for the patient to continue treatments. In some sections of Texas in order for a patient to receive a pneumothorax refill he has to travel one hundred or more miles. To the indigent patient this precludes this type of treatment. In many instances it forces the sanatorium to resort to other measures not so effective in the control of the disease for the particular patient. In other words, we are defeating our purpose and the full benefits of the sanatorium care cannot be applied to all patients needing special treatment and admitted to the institution.

If tuberculosis committees were available in each county medical society worthwhile information on a general level or for the local community could be channelled from the various official and non official agencies of the State, and in turn the committee

might easily bring these matters to the attention of the medical society. The results from a well informed and industrious committee if present in each county, would lead to a closely woven and well coordinated tuberculosis program throughout the entire State of Texas. Control measures would be more readily understood and balanced. Much of the effort now expended in many counties is useless and futile. Tuberculosis testing programs in the school systems might be avoided and the resources for the control of the disease might be channelled into productive effort. Where local means are available the proper segments of the population should be examined where the disease is known to have a higher incidence or those segments of the population where occupational hazards are recognized so that all productive efforts could be coordinated and the instituted case finding measures would supply the most number of unrecognized cases of the disease at the lowest cost per unit case.

With the stimulation of interest in the tuberculosis movement in any community, the usual procedure is to request first services involving the school population because of the ease with which they can be reached. After a study of tuberculin testing programs and case finding programs that have been provided in the school systems of Texas over the past few years we now realize that tuberculosis as a disease is not an important problem in Texas among school children. Usually a school child showing evidence of infection has obtained the infection from an immediate family contact. If the contact is recognized and treated together with proper precautions to prevent its spread, the child with the original positive tuberculin test will usually enjoy good health. We have lost sight of the fact that the most important thing among children is the search for the original source of infection and its recognition. When the school testing program is completed, here we stop and instead of going into the family and finding the original case we simply miss the boat. In other words we are more interested in doing 500 or 1,000 tests in a school system, and seldom figure the cost of the testing program and the time involved in relation to the discovered cases. School programs are expensive methods of finding tuberculosis. Tuberculosis is primarily a disease of adults and the spread of the disease occurs from the adult to the child, therefore our efforts should be directed toward the examination of the adult population of Texas rather than the school population of the State.

As a public health worker my contact with local county medical societies leads me to feel that sometimes I am under suspicion as one of the promoters of State medicine. This is a far cry from the actual facts and our duties. Every effort is made by the state



health department to limit their activities to the field of prevention of diseases. In the case of tuberculosis with the heavy expense and costly equipment involved, it is frequently necessary to supplement case finding measures and in this case the health department does enter into the diagnostic field. In no instance does the health department do any direct treatment of cases of tuberculosis but merely supplements the machinery on the local level and upon local request for this additional service. If a tuberculosis committee were present in the county medical society preliminary discussions of the program might well occur with this committee. The committee in turn would approach the county medical society. I firmly believe this society would have more confidence in the recommendations of some of their fellow physicians. The committee, thus in turn would remove the stigma of socialized medicine from the state health department. Where the local committee would function in its proper capacity it would practically eliminate the necessity for contact directly with the local county medical society and would lend support to the idea that all programs involving the health of the people would be the responsibility and under the complete control of the local county medical society. It is under the present plan, but at least it would remove some of the objections that we frequently confront when we are facetiously referred to as trying to sell the local county society a "bill of goods."

In summary the advantages of a local tuberculosis committee of the county medical society might be said to consist of a direct educational value to the people of the county and to the local medical profession. A well coordinated program of control could be formulated. A more complete picture of the problem and the needs might be presented to the public and to the medical profession. Through the liaison activities of the committee much of the suspicion of official and non official agencies can be removed toward the motives of suggested programs for the local benefit. An interest by a few physicians in each county will eventually lead to a more affective and complete tuberculosis control program on a local level. The committee as a whole would be benefited, the victims of the disease would receive better treatment and the medical profession in general would develop an awareness of the disease, and the modern concepts of control of the disease.

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# Letter from the Republic of Panama

## TREATMENT OF BRONCHIECTASIS AND OF BRONCHIAL SUPPURATIONS BY INTRATRACHEAL INJECTIONS OF PENICILLIN

For some time in our Medical Service, all cases of bronchiectasis have been treated by intratracheal injections of penicillin. Our technique is so simple that we believe it may be of interest to present it.

The patient is put on a table, the head extending beyond it and is held in slight hyperextension by an assistant. With a 20 or 22 gauge hyperdermic needle, the cricothyroid membrane is punctured and 3 cc of a 5 per cent solution of cocaine are injected slowly. This injection must not be finished in less than three minutes so as to allow complete anesthetization of the trachea and bronchi. A complete anesthesia is obtained when the patient indicates an indefinite sensation in the throat.

Penicillin is then injected through the same puncture needle. The penicillin solution contains 100,000 units in 5 cc of distilled water. When there is a bilateral bronchiectasis, we inject 5 cc of this solution into each bronchial tree. If unilateral bronchiectasis is present only the diseased portion is treated.

The position of the patient depends upon the localization of the process. Usually it takes half a minute to inject the five cc portion. We have employed this technique more than a hundred times. All of the patients have tolerated them perfectly. Many of them have not coughed for hours after the injection and always have walked back to their wards, with the exception of too sick cases. Postural drainage is used for several days before the injection.

After the first injection, the sputum becomes more liquid and is reduced in amount. Fever, foul odor of the sputum and all toxic phenomena also disappear. The appetite returns and there is a general improvement in the condition of the patient.

We believe that our technique can be of great help in the preparation of the patient for lobectomy although it does not exclude the inhalation of nebulized solutions of penicillin. On the contrary, both methods complement each other.

Hernandez Loeches, M.D., Chief of Medicine  
Hospital de David, Rep. de Panama

## Annual Meeting, Executive Council

The members of the Executive Council of the College met at the Ambassador Hotel, Atlantic City, Thursday morning, June 5, 1947. The reports of the standing councils and special committees were reviewed and approved. These reports were presented before the general assembly on Friday, June 6, and are published in this issue of the journal.

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## Annual Meeting, Board of Regents

The Board of Regents of the College met in annual session at the Ambassador Hotel, Atlantic City, Thursday afternoon, June 5, 1947. The meeting was called to order by Dr. Joseph C. Placak, Chairman of the Board of Regents. The following members of the Board registered for the meeting:

Joseph C. Placak, M.D., Cleveland, Ohio, Chairman  
Donato G. Alarcon, M.D., Mexico City, Mexico  
Andrew L. Banyai, M.D., Milwaukee, Wisconsin  
Robert K. Campbell, M.D., Springfield, Illinois  
Dean B. Cole, M.D., Richmond, Virginia  
Edward W. Hayes, M.D., Monrovia, California  
Charles M. Hendricks, M.D., El Paso, Texas  
William A. Hudson, M.D., Detroit, Michigan  
Chevalier L. Jackson, M.D., Philadelphia, Pennsylvania (alternate)  
Minas Joannides, M.D., Chicago, Illinois  
Major General S. U. Marietta, Washington, D. C.  
Louis Mark, M.D., Columbus, Ohio  
Jay Arthur Myers, M.D., Minneapolis, Minnesota  
William E. Ogden, M.D., Toronto, Canada  
Richard H. Overholt, M.D., Brookline, Massachusetts  
J. Winthrop Peabody, M.D., Washington, D. C.  
Karl Schaffle, M.D., Asheville, North Carolina  
A. J. Steiner, M.D., St. Louis, Missouri (alternate)  
Moses J. Stone, M.D., Boston, Massachusetts  
Nelson W. Strohm, M.D., Buffalo, New York  
James H. Stygal, M.D., Indianapolis, Indiana  
Paul A. Turner, M.D., Louisville, Kentucky  
Harry C. Warren, M.D., San Francisco, California

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Murray Kornfeld, Chicago, Illinois, Executive Secretary  
Harriet E. Lumm, Chicago, Illinois, Assistant to the Executive Secy

The Secretary-Treasurer of the College presented his report as follows:

## Report of the Secretary-Treasurer

The following is a summary of the Financial Report for the fiscal year ended April 30, 1947 (LaSalle Audit Company, Chicago)

BANK BALANCE, May 1, 1946	\$30,843 69	
Cash Receipts, May 1, 1946 to April 30, 1947	60 414 06	
	<hr/>	
TOTAL CASH AVAILABLE		\$91,257 75
Disbursements, May 1 1946 to April 30, 1947		44,314 96
		<hr/>
BANK BALANCE, APRIL 30, 1947		
General Fund	\$36,877 29	
Endowment Fund	750 00	
Life Membership Fund	2,085 00	
Research Council Fund	7,230 00	\$46,942 79
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## BALANCE SHEET — APRIL 30, 1947

## A S S E T S

## ENDOWMENT FUND

Cash in First National Bank of Chicago	\$ 750 00	
United States Savings Bonds—Series G	10,000 00	
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TOTAL ENDOWMENT FUND		\$10,750 00

## LIFE MEMBERSHIP FUND

Cash in First National Bank of Chicago	\$ 2,085 00	
United States Savings Bonds—Series G	1,300 00	
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TOTAL LIFE MEMBERSHIP FUND		\$ 3,385 00

## RESEARCH COUNCIL FUND

Cash in First National Bank of Chicago		7,230 50
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## GENERAL FUND

Cash in First National Bank of Chicago	\$36,877 29	
Cash on Hand	25 00	
United States Savings Bonds—Series G	10,000 00	
Accounts Receivable	981 97	
Furniture and Fixtures (at Cost)	2,056 60	
Prepaid Expense (Convention Badges)	363 46	
Deposits — Airlines	675 00	
	<hr/>	
TOTAL GENERAL FUND		\$50,979 32

## TOTAL ASSETS

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 \$72,344 82
 

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## LIABILITIES AND SURPLUS

## LIABILITIES

Collections toward Fellowships	\$ 6,355 00
Fellowship Fees Collected (Pending Examination)	6,350 00
Special Fund	4,619 00
Publications Fund	2,887.32
Chapter Funds	440 00
Miscellaneous Liabilities	227 84
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## TOTAL LIABILITIES

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 \$20,879 16
 

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## SURPLUS

Endowment Fund Surplus	\$10,750 00	
Life Membership Fund Surplus	3,385 00	
Research Council Fund Surplus	7,230 00	
General Fund Surplus	30,100 16	
<b>TOTAL SURPLUS</b>	-	51,465 66
<b>TOTAL LIABILITIES AND SURPLUS</b>		\$72,344 82

The College operated during the fiscal year ended April 30, 1947, on a budget of \$36,530 00 Total expended was \$36,781 84, which was \$251 84 above the budget allowed Expenditures approved by the Board of Regents during the year, and not budgeted, amounted to \$6,572.29 For the current fiscal year, starting May 1, 1947, and ending April 30, 1948, a budget has been approved by the Executive Council in the amount of \$41,350 00

Minas Joannides, M.D., *Secretary-Treasurer*

The following councils and committees then presented their reports

## Report of the Membership Committee

As of June 1, 1947, there were 2272 members in the College, and there were 80 applications for membership pending investigation This is an increase of 305 new members during the past year Of the 2272 members, 1652 are Fellows, 125 Associate Fellows and 495 Associate Members

During the past year, we have added 177 new Fellows to our roster, 5 new Associate Fellows, and 123 new Associate Members

Below we have listed the College membership by countries, which shows that we have members in 37 countries other than the United States and its possessions

<i>The United States of America</i>	1682
<i>Possessions</i>	
Alaska	4
Canal Zone	2
Hawaii	18
Puerto Rico	35
	59

*Other Countries*

Argentina	67	Italy	1
Australia	21	Jamaica	1
Belgium	16	Jugoslavia	1
Bolivia	6	Lebanon	2
Brazil	73	Mexico	39
Canada	75	New Zealand	1
Chile	51	Nicaragua	1
China	5	Norway	1
Colombia	10	Paraguay	3
Costa Rica	7	Peru	22
Cuba	25	Philippines	9
Dom Rep	2	Portugal	1
Ecuador	8	Rep of Panama	9
El Salvador	3	South Africa	16
England	1	Sweden	1

Greece	14	Switzerland	3
Guatemala	3	Uruguay	6
Haiti	3	Venezuela	22
India	2		—

531

TOTAL MEMBERSHIP

2272

Roy A Wolford, M.D., *Chairman*

## Report of the Committee on Public Relations

The Committee on Public Relations of the American College of Chest Physicians has confined its program to obtaining mention of College activities in recognized state, national, and foreign medical journals. During the past year, ending June 1, 1947, articles appeared which related to College activities in the following journals

State Medical Journals	36 notices
Journal of the American Medical Association	4 notices
Other national medical journals	9 notices
Foreign medical journals	4 notices
<b>TOTAL</b>	<b>52 notices</b>

In addition, many of the scientific programs of the College Chapters were published in the official programs of the state and district medical societies, as well as publicized in the state and district medical journals. No doubt, other mentions were made of College activities which have not come to our attention.

John Roberts Phillips, M.D., *Chairman*

## Report of the Scientific Program Committee

The Scientific Program Committee has undertaken its task with the full appreciation of its serious responsibility. We had to live up to the shining examples of our predecessors and at the same time fulfill the anticipation of the scientific interest of the Fellowship in modern issues, in recent accomplishments of medical research and in competent evaluation of controversial clinical problems. We have endeavored to assemble speakers whose qualities as clinicians, research workers, teachers and public health organizers have the hallmark of competency and superior knowledge.

The arrangement of the program has been such that due space and time has been allotted for the discussion of various epidemiologic and clinical aspects of tuberculosis. The array of various medical and surgical treatment measures includes the oldest method, bed rest and the newest one, streptomycin. Between these two extremes, representative speakers have been assigned to critical and analytical reviews of such items as pneumothorax, artificial pneumoperitoneum, extrapleural pneumothorax, thoracoplasty, lobectomy and pneumonectomy. From a glance at the program, it is evident that we have succeeded in establishing a wholesome balance between medical and surgical topics dealing with tuberculosis.

No less emphasis has been given to subjects which cover certain aspects of differential diagnosis, encompassing the gastrointestinal tract and cardiology. One of the newest departures in the latter is angiocardiography, therefore, its presentation was thought to carry an appeal to all interested in chest diseases.

It would be too lengthy to enumerate all of the other subjects included in the scientific program. Suffice it to say that we have tried to focus the attention of the audience on a great assortment of scientific problems, each of which is of importance in the practice of the chest physician.

On account of the magnitude of the scientific program, we have been obliged to select only one discussant for subjects presented on the first day. For the discussion of all of the other presentations, two discussants were secured. We wish to point out that while several outstanding authorities have been invited to speak at the meeting who are not Fellows of the College, we insisted on offering places as discussants to members only. In this manner we expected to obtain the benefit of "extramural" knowledge as well as a cross section of the scientific thinking of the Fellows of the College.

Previous technical policies of the annual meeting have been adhered to in that each speaker is limited to twenty minutes, with the exception of very few lengthy subjects. Discussions are limited to five minutes. Each subject is open for discussion from the floor, following the talks of the discussants invited. All presentations are closed by a five minute summary by the speaker.

The set-up of the program is such that despite its high scientific standards, various geographic segments of the country are well represented. As a matter of fact, we have speakers not only from the Atlantic to the Pacific and from the Gulf of Mexico to our Northern boundaries, but also from Canada and from England.

The list of participants in the scientific program has a truly international character. Nothing is more expressive of the vast sphere of the College as a scientific body than the program arranged under the auspices of the International Night. Fellows of the College are gathering here from Mexico, Cuba, Argentina, Paraguay, from Switzerland, Yugoslavia, Australia, the Philippine Islands and from China. What a splendid manifestation of human, medical and scientific harmony and solidarity. A distance of ten thousand miles is no short span to travel for the sake of a meeting, as it has been done by some of our distinguished Fellows. But, evidently, the lofty purposes, great accomplishments and ambitious ideals of the American College of Chest Physicians make the distance disappear and unite the Fellowship of this organization in a common endeavor for greater and better service through science to humanity. It may be disclosed at this time that only unsurmountable technical difficulties, not distance, have prevented some of our Fellows from being at the annual convention, Fellows from Norway, Belgium, France, Portugal, Italy, Greece and from a number of other countries.

An evening session with the Panel of Experts on the program has become by now a cherished traditional event. It is with pride and satisfaction to point out the prominent scientific and teaching background of each and every one of the men called upon to serve on this panel. This session has developed into a most potent source of up-to-the-minute information. It is an open forum where Fellows of the College

may bring their unsolved problems pertaining to Medicine, Surgery Bronchoesophagology, Roentgenology and Pathology Nuggets of new knowledge and gems of medical wisdom are given away for the asking Truly, it is a miniature post-graduate course on distinguished scientific level That is why it is not surprising to see an avalanche of questions pouring in from all over the country Questions and answers given at this session are published in the College Journal, "Diseases of the Chest," for the edification of those who were unable to attend

The scientific transactions culminate in and end with an X-Ray Conference During this session, interesting and unusual cases are presented in each of which a definite diagnosis has been established by examination of a surgical-pathological specimen, bronchoscopic examination, post-mortem examination or by laboratory data Slides are prepared of the x-ray films and projected on a large screen so that they are easily visible to the entire audience Simultaneously with the showing of the slides, a five minute summary of the history, physical findings, significant laboratory work, surgical findings or of the necropsy is given by the contributor A mimeographed resume of the findings in each case is made available for the perusal of the audience

The members of the Scientific Program Committee will look upon your endorsement of our efforts and upon the anticipated large attendance at the scientific sessions as our most cherished reward

Respectfully submitted to the Board of Regents by the Scientific Program Committee

Andrew L Banyal, M.D, *Chairman*

## Report of the Council on Undergraduate Medical Education

The Council on Undergraduate Medical Education, during the past year, has devoted its time and efforts principally to the preparation of the text book on Tuberculosis, which is sponsored by the American College of Chest Physicians

The material for this book, with the exception of the chapter on Pathology, the preparation of which has been delayed by illness, is now in the hands of the publisher, The Charles C Thomas Company of Springfield, Illinois

The publishing company have advised us that they will make every effort to have the book published as soon as possible and it is our hope that this will be done before the opening of medical schools next September

Your Council plans now to contact medical teachers and medical schools throughout the United States and Canada and call their attention to this book and urge, that as far as possible, it be placed in the hands of all medical students and medical teachers

This Council solicits the aid of the various units of the College and their officers in this work We are particularly anxious to have the officers and representatives of the College who are in a position to have personal contact with medical schools and those in charge of the department of chronic diseases of the lungs use their influence in promoting the distribution of this book It is felt that personal contact particularly by those who are known to the medical schools, will be a more valuable factor in this work

Edward W Hayes, M.D, *Chairman*



## Report of the Council on Postgraduate Medical Education

The Council on Postgraduate Medical Education reported that plans were discussed for continuing postgraduate medical education in diseases of the chest and it was announced that the next course would be given in Chicago, September 15-20 Dr Edwin R Levine, a member of the Council on Postgraduate Medical Education and Chairman of the Medical Education Committee of the Illinois Chapter of the College, was authorized to proceed with the arrangements for this course

A complete report of the Council will be published in a future issue of the journal

J Winthrop Peabody, M.D, *Chairman*

## Report of the Council on Public Health

At the annual meeting in San Francisco, 1946, the name of this Council was changed from "The Council on Military Affairs and Public Health" to "The Council on Public Health" The former Council under the able guidance of Dr Charles Hendricks did splendid work during the war years and was of especial aid to the services in bringing about the x-raying of all inductees Now that this policy has been established and because the war is over, it was felt best to discontinue the efforts of the Council in regard to military affairs A short time elapsed before the Council membership was completed and it now consists of the following members

Paul A. Turner, M.D, Louisville, Kentucky, Chairman  
 Sidney A Britten, Comdr, M C, U.S.N, Washington, D C  
 Richard Davison, M.D, Chicago, Illinois  
 John B Grow, Col, M C, U.S.A, Denver, Colorado  
 W H Hatfield, M.D, Vancouver, British Columbia  
 Herman E Hilleboe, M.D, Assistant Surgeon General, USPHS,  
 Washington, D C  
 Samuel E Thompson, M.D, Kerrville, Texas  
 Walter E Vest, M.D, Huntington, West Virginia  
 Roy A Wolford, M.D, Veterans Administration, Washington, D C

A meeting of the Council was planned in order to determine what should be undertaken for the benefit of the specialty of chest diseases as related to public health The meeting was held in Washington, D C, February 27, in the offices of Dr Herman E Hilleboe, Assistant Surgeon General, USPHS Those present were

Comdr Sidney A Britten, M C, U.S.N  
 Dr Herman E Hilleboe, Assistant Surgeon General, USPHS  
 Col Roy A Wolford, Veterans Administration  
 Dr Walter E Vest, Huntington, West Virginia  
 Paul A Turner, M.D, Louisville, Kentucky, Chairman

### By Invitation

Major General S U Marietta, President-Elect, ACCP  
 Dr J Winthrop Peabody, Past President, ACCP  
 Dr John Barnwell, Chief Tuberculosis Division, Veterans  
 Administration

The first matter to come before the Council was the election of speakers to appear at the luncheon meeting Friday, June 6, at the annual

meeting in Atlantic City. A general topic of discussion was eventually selected, i.e., "Experiences of the United States Services in the Control of Tuberculosis in World War II as compared with World War I and Plans for the Future." Speakers selected were Dr. Francis J. Weber, Medical Director, Chief of Tuberculosis Control Division, USPHS, Washington, D. C., to speak for the USPHS, Commander Sidney A. Britten, M.C., U.S.N., to speak for the Navy, Colonel Roy A. Wolford, Assistant Chief of Tuberculosis Division, Veterans Administration, to speak for the Veterans Administration, Colonel John B. Grow, Fitzsimmons General Hospital, Denver, to speak for the Army. Dr. John Barnwell, Chief Tuberculosis Division of Veterans Administration, consented to summarize the discussions. These talks are to be limited to ten minutes each.

Through the discussions by these leading authorities, the Council feels that the members of our organization will be benefited by knowing the tremendous strides forward that the various services have made toward the control of tuberculosis, and will be glad to know what is being contemplated in the future to be undertaken for the eradication of tuberculosis. We also hope that there will be time for these speakers to mention any other activities having to do with public health which touch other diseases of the chest.

The Council then undertook to determine how it could function to help the College and other physicians chiefly interested in chest diseases. After considerable discussion it was determined that we should limit our endeavors in public health to those affecting all diseases of the chest, with the exception of heart disease, but with special reference to tuberculosis. We feel that there should be no duplication of effort, if possible, and that problems affecting the heart should be taken care of by the heart organizations.

It was further agreed that no council or committee could properly make any extensive investigation of any one phase of our subject without some full-time personnel and proper financial support. During the discussion of this point several things were mentioned which must have further investigation, and among these streptomycin was mentioned and the recent appropriation of one million dollars for the investigation of this drug. Dr. Hilleboe then discussed at length the present status of tuberculin and the necessity for a tremendous amount of research in regard to the second strengths which have been found to be unsatisfactory. He also discussed BCG and the plans under way for the extensive testing of this preparation, which appears finally to loom as a very effective immunization product. Commander Britten then mentioned some of the investigations contemplated by the Navy. After discussing such things as these and realizing the tremendous amount of time and money which would have to be expended before anything could be accomplished in such investigations, the Council came to the conclusion that it could serve best if it acted as an information bureau where the up-to-date information in regard to all scientific investigations could be procured. It was, therefore, agreed that this Council would endeavor to be an information bureau in regard to matters pertaining to public health as affect diseases of the chest, excluding heart disease and emphasizing tuberculosis. We will be glad to receive questions and problems from any doctor whose interest is chiefly in chest diseases. The Council will then transmit these questions or problems to sources making the investigations in question. Upon receipt of the

information desired it will be given to the doctor who made the request and it will also be sent to all medical journals in this Country and in countries where there are chapters of the College

We hope to make the above suggested arrangements with all foundations and scientific investigators As a start the United States Services have agreed to give us a combined release of up-to-the-minute news every quarter In turn, of course, the Council agrees to transmit to the various services whatever questions and problems received which have to do with their work If the Council can effectively function in the manner described, it is hoped that we can broadcast accurate information before the scientific papers can be published in the medical and surgical journals and before inaccurate statements are read in digests which often appear in lay publications

The Council went on record as favoring at least two meetings each year and agreed to have the next meeting in Atlantic City at the time of the annual meeting of the American College of Chest Physicians We expressed to Dr Hilleboe our thanks for the use of his office for this meeting

Paul A Turner, M.D, *Chairman*

### Report of the Committee on Diseases of the Chest in Mental and Penal Institutions

Dr Otto L Bettag, Pontiac, Illinois, Chairman of the Committee on Diseases of the Chest in Mental and Penal Institutions, read a report of his committee It was recommended that copies of this report be sent to Commissioners of Mental Health in the various states and to all organizations interested in mental hospitals

### Report of the Committee on Occupational Diseases of the Chest

The Committee on Occupational Diseases of the Chest wishes to report that during the year 1946-1947 many changes in the occupational laws have been made in various states There still remains many states which do not have occupational disease laws and many states whose laws are quite unsatisfactory as far as the care of the disabled worker is concerned We are trying, through the various members of the College and members of the committee, to encourage the improvement of laws which now exist in each state for better care and service to the disabled workers

The task is a great one and quite difficult because of the fact that each state has different problems, but we feel that progress is being made and by continued effort greater uniformity of laws will result

Louis Mark, M D, *Chairman*

### Report of the National Council of Tuberculosis Committees

The National Council of Tuberculosis Committees has carried on its program of encouraging the organization of tuberculosis committees in the state and county medical societies since 1938 All but a few states have organized tuberculosis committees In several of the states, tuberculosis committees have been organized by many of the county medical

societies Through this extensive organizational program, more and more physicians have become interested in the campaign being waged against tuberculosis

In this report, we particularly want to commend the Medical Societies of the states of Minnesota and Texas for their cooperation in establishing the machinery necessary to carry out a constructive tuberculosis program We are pleased to attach to this report, the report of the Committee on Tuberculosis of the Medical Association of Texas as given at the 80th Annual Session of the Society held at Dallas, May 5-8, 1947

## REPORT OF THE COMMITTEE ON TUBERCULOSIS MEDICAL ASSOCIATION OF TEXAS

This committee was reorganized at the suggestion of the Board of Trustees of the State Medical Association, on an overlapping five year term of office basis at the last annual meeting of the Association The duties of the committee are as follows

" It shall be the duty of this committee to give continued study and consideration to the problem of tuberculosis in all of its phases, cooperate with the state health department and constituted health authorities throughout the state in the campaign of prevention and suppression of disease, and promote and direct activities of the State Medical Association of Texas in this connection "

The following objectives of the committee were adopted through correspondence, immediately after the committee had been appointed

- 1 To act as a liaison group between the State Health Department (Tuberculosis Section), Texas Tuberculosis Association, and the State Medical Association
- 2 To keep in touch with all phases of state and federal efforts in the control of tuberculosis
- 3 To work for improvement in the teaching of tuberculosis and all diseases of the chest in our medical colleges
- 4 To assist in arranging for more internships in our tuberculosis hospitals
- 5 To lend assistance to a movement for training schools for Negro nurses in our State Sanatorium for Negroes
- 6 To encourage general hospitals to complete chest x-rays on each patient upon admission as a routine procedure
- 7 To continue to encourage mass x-ray surveys of all industries, mercantile companies, schools, colleges, and eleemosynary institutions
- 8 To lend support to legislation that would provide an adequate number of tuberculosis beds to meet the tuberculosis situation in Texas
- 9 To assist in a drive toward the isolation of each open case of tuberculosis
- 10 To further the cause of rehabilitation of all tuberculous patients
- 11 To assist in any effort toward the improvement of the standards of administration of all state tuberculosis hospitals
- 12 To assist in the improvement of the medical and surgical treatment of tuberculosis in our state sanatoria
- 13 To endeavor to have a strong tuberculosis committee in each county medical society of the state, the duty of the county com-

mittee to keep in close touch with local health authorities on all phases of tuberculosis control

- 14 To meet from time to time with the medical section of the state health department and the Texas Tuberculosis Association
- 15 To seek the cooperation of the Texas Tuberculosis Association, the State Health Department (Tuberculosis Section), and the State Medical Association, in the exchange of information concerning the state tuberculosis problem, in order that the efforts of each may be coordinated

The Committee decided to hold its meetings in Austin, at the time that the Board of Directors of the Texas Tuberculosis Association holds its meetings. It was also decided to invite the Executive Committee of the Texas Tuberculosis Association and the Tuberculosis Control Officer of the State Health Department, to meet with our committee for the discussion of all problems of tuberculosis control, its treatment, and the rehabilitation problems of the state of Texas. We are happy to report that the suggestion was agreeable to all concerned, as in no other way could the exchange of information and the coordination of the efforts of the organizations concerned be accomplished.

The first meeting of the Committee on Tuberculosis and the Executive Committee of the Texas Tuberculosis Association was held December 15, 1946, with all members of both organizations present, including Dr Howard E Smith, Tuberculosis Control Officer of the State Health Department. All of the objectives of the committee were discussed, including the proposed training school for Negro nurses at the state sanatorium at Kerrville. It was agreed that a committee be appointed to investigate the sanatorium at Kerrville, the committee to be a joint committee of the Committee on Tuberculosis and the Executive Committee of the Texas Tuberculosis Association.

It was agreed to support the bill now pending in the State Legislature to provide two district sanatoria. It was also agreed that after these bills shall have passed and the new sanatoria established, new legislation would be sought which would correct all obsolete provisions now in force in our state institutions.

It was decided to invite each county medical society to appoint a committee on tuberculosis.

It was also agreed that there would be a mutual exchange of information between the Committee on Tuberculosis of the State Medical Association and the Texas Tuberculosis Association, and the Executive Secretary of the State Medical Association.

The second meeting was held March 16, 1947. In addition to those present at the first meeting, Dr Robert J Anderson of the United States Public Health Service was present by invitation.

The report of the committee to investigate conditions at the state sanatorium at Kerrville was discussed. This report was presented to the chairman of the Board of Control with the request that the Board of Control inform the committee what steps would be taken in correcting the deplorable conditions found to exist at this state institution.

#### *Analysis of Tuberculosis Situation in Texas*

There are approximately 3,000 deaths from tuberculosis in the state of Texas annually, 68 per cent of the total deaths in the state occur outside of any institution. Approximately 2,000 beds are available for

the average citizen of the state There is evidence of bed wastage in all state sanatoria, so far as tuberculosis control is concerned Many patients with non-infectious disease are being hospitalized while those with open cases, somewhat advanced, are being refused admission There are no surgical facilities at either of the state supported sanatoria There is no surgical room whatsoever at the Negro sanatorium at Kerrville This condition exists in spite of all the progress in bronchoscopy and thoracic surgery in the past ten years

Out of the 2,000 beds mentioned, only 1,150 are provided by the state, and 650 by various city and county institutions As the case finding develops, the case load will be tremendously increased, however, if the establishment of the two proposed sanatoria is accomplished, the case load will be much reduced One of the most important essentials in a tuberculosis program is financial aid to the bread winners who become incapacitated from tuberculosis Texas has given little or no attention to this problem Case finding programs in other parts of the country and in government service, have shown tuberculosis rates to be highest among domestics Since domestic servants in Texas come mainly from the Latin American and Negro classes, greater efforts toward the control of the disease in these two groups is imperative In analyzing the tuberculosis situation in Texas, any further progress to be made depends upon appropriations for more beds, the use of available beds to be confined to open cases for isolation purposes, the establishment of surgical facilities at all state sanatoria, physical examination of all domestics and food handlers, adequate laws governing the isolation of open cases, and increasing the interest of each physician in the state toward the tuberculosis problem

The case finding program in Texas is progressing as rapidly as photographic units and technical assistants are obtained Case findings in eleemosynary institutions will be begun soon The x-ray examination of chests of all patients admitted to general hospitals has barely begun It is our hope that within the next few months this program will be adopted throughout the state

The question of vaccination against tuberculosis was discussed by Dr Anderson of the United States Public Health Service, who stated that vaccinations by this service would probably be begun in Columbus, Georgia It was learned from the State Tuberculosis Control Section that arrangements were being made to request that the BCG vaccine program be instituted in Texas, probably in Hidalgo County

It was found that the measures providing for the establishment of two district sanatoria in Texas, which were being prepared for introduction in our State Legislature, were being held in abeyance pending the outcome of negotiations for securing Moore Field at Mission and Camp Fannin at Tyler from the War Surplus Administration, to be turned over to the Board of Control and converted into sanatoria for tuberculosis

Letters have gone from the Committee on Tuberculosis to presidents of county medical societies in the state, requesting them to appoint committees on tuberculosis Many such committees have been appointed

After studying the reports from medical schools of Texas, as to the number of hours devoted to the teaching of tuberculosis, it was agreed that the program for teaching tuberculosis should be greatly expanded

*Recommendations*

We recommend that provisions for chest surgery be made at the earliest possible date at each of the state sanatoria now in existence and to be established in the future. The members of this committee, together with physicians who are members of the Board of Directors of the Texas Tuberculosis Association, are positively opposed to the transportation of tuberculosis patients to Galveston for thoracoplasties. They do not object to the procedure during the present emergency, but that they are against it as a long range practice. We recommend the acceptance of the proposal by the United States Public Health Service to furnish, free of charge, a thoracic surgeon for two years, this surgeon to be maintained at one or the other of the state sanatoria and perform all surgical operations which are indicated on any and all state patients with tuberculosis.

We recommend legislation which will correct all obsolete provisions of our state laws governing tuberculosis sanatoria.

We recommend that, unless conditions now existing at the State Sanatorium for Negroes at Kerrville are improved at an early date, the institution be closed for the good of all concerned.

We recommend that the State Medical Association Committee on Tuberculosis be an official advisory board to the State Board of Control, and to the medical superintendents of all state tuberculosis sanatoria. The committee should be sanctioned by law in order to be effective.

We respectfully request the Board of Trustees of the State Medical Association to set up a fund to reimburse members of this committee, for their actual expenses in attending its meetings, only those members of the committee who are not also members of the Board of Directors of the Texas Tuberculosis Association to be eligible for reimbursement. This fund should also be sufficient to reimburse members of the committee who are required to attend any special meetings, such as the inspection of institutions or sites for institutions. The fund should also provide stationery, postage, mimeographing and printing that the committee may require to circularize county medical societies throughout the state.

*Respectfully submitted,*

C M Hendricks, M.D., Chairman.  
Charles J Koerth, M.D.,  
David McCullough, M.D.,  
Howard T Barkley, M.D.,  
Jesse B White, M.D.

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The Tuberculosis Committee of the Minnesota State Medical Society arranged for a special program on diseases of the chest in connection with its annual meeting held in Duluth, Minnesota on July 1. This session was attended by a large number of physicians in the general practice of medicine and all of the papers were well received.

The National Council of Tuberculosis Committees has sponsored luncheon meetings at the past two Annual Meetings of the College and

we are pleased to report that there is a great amount of interest shown in these meetings

Our Council would like to receive the reports of the tuberculosis committees of the other state medical societies

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James F Brewer, M.D , New Bedford, Massachusetts,  
Maurice Campagna, M.D , New Orleans, Louisiana,  
Cole B Gibson, M.D , Meriden, Connecticut,  
D W Heusinkveld, M.D , Cincinnati, Ohio,  
John S Packard, M.D , Allenwood, Pennsylvania,  
Rufus A Schneiders, M.D , San Diego, California,  
Nelson W Strohm, M.D , Buffalo, New York,  
Darrell H Trumpe, M.D , Springfield, Illinois

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Dr William E Ogden, Regent of the College for Canada, gave a report regarding the increase in College membership in Canada Dr Ogden stated that everything was being done in Canada to uphold the high standards for membership in the College in that country

Dr Charles M Hendricks made a report regarding the efforts of the College to establish a section on diseases of the chest in the American Medical Association He presented the following resolution which was unanimously adopted

WHEREAS, A resolution to establish a Section on Diseases of the Chest will be introduced before the House of Delegates of the American Medical Association meeting in Atlantic City, New Jersey, June 9-13, 1947, and

WHEREAS, In accordance with the prescribed procedure of the House of Delegates of the American Medical Association this resolution will be referred to a Reference Committee,

THEREFORE, BE IT RESOLVED, That a committee of three or more members of the College be appointed by the President to appear before the Reference Committee of the American Medical Association to present the arguments in favor of the establishment of such a section in the American Medical Association

The following committee was appointed to meet with the Reference Committee on Sections and Section Work of the American Medical Association

Charles M Hendricks, M.D  
Major General S U Marletta  
J Winthrop Peabody, M.D

### Report of the Committee on the Management and Treatment of Diseases of the Chest

Dr Edwin R Levine, Chicago, Illinois, Chairman of the Committee on the Management and Treatment of Diseases of the Chest, and Dr Karl H Pfuetze, Cannon Falls, Minnesota, Chairman of the Committee on Chemotherapy and Antibiotics, presented their reports to the Board of Regents These reports will be published in a later issue of "Diseases of the Chest" The Committee on Chemotherapy and Antibiotics was



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authorized to release a statement to the press on the value of streptomycin in the treatment of tuberculosis and other chest diseases. It was further recommended that Dr Pfuetze's report on streptomycin be given before the general assembly of the College.

## Report of the Committee on State Laws for Tuberculosis

On previous occasions, it has been our honor and privilege to call to the attention of the Board of Regents and of the Fellowship of the College that a complete collection of State Laws for Tuberculosis has been gathered by this Committee and is available, through the office of the Executive Secretary, for the perusal by all interested in this subject. At this time, we wish to give a summary of changes which have taken place in tuberculosis control activities in the various States during 1945 and 1946, together with other data which have a bearing on legislative and public health efforts focused on the eradication of this disease. Some of the States reported no relevant changes.

Although not all the information we intended to collect has reached us at the time of completion of this report, we are confident that through the excellent cooperation this Committee has been receiving from the various State Health Departments, in general and from the Tuberculosis Controllers, in particular, our files covering pertinent State Legislation can be maintained accurately and up-to-date as heretofore.

### ARIZONA

Gerald R. Clark, M.D., Director, Division of Tuberculosis Control, Arizona State Department of Health, reports on two changes that have taken place in the last two years. In the summer of 1945, tuberculosis was included in Regulation 3 of the "Rules and Regulations of the State Department of Health for the Control of Communicable Diseases." Thus, tuberculosis has become subject of definite control measures. These include the following paragraph: "When a health officer has reasonable grounds to believe that a person or persons may have been exposed to a communicable disease, he may control them as known contacts, making such examinations and adopting such measures as he deems necessary and proper for the protection of the public health and the prevention of the spreading of the disease." Evidently, the regulations permit the isolation of the patient with positive sputum and also, the use of the tuberculin test and the taking of chest roentgenograms in all contacts.

The 18th Arizona Legislature which adjourned in 1947 passed a bill (House bill 166) which transfers the State Tuberculosis Sanatorium from the State Board of Social Security and Welfare to the supervision of the State Department of Health. This implies that the latter is planning to undertake a program of enlarging the institution which at the present time has only 94 beds and to improve the quality of services now offered by this institution.

There has been an intensive tuberculosis case finding program in effect since the spring of 1945. It is hoped that it will serve a double purpose: (1) It solves the most pressing health problem of the State; (2) It gives an incentive to legislative endeavors for the enlargement of the only tuberculosis institution of the State.

The State mass x-ray survey program was slow in starting, but it

picked up impetus after intensive publicity by the Division of Tuberculosis Control and by the Anti-Tuberculosis Association Up to March 1947, 130,000 have been x-rayed once, with a number of communities not yet covered During the same period, reporting of cases by agencies and private physicians has improved considerably and the only two organized County Health Units have expanded their tuberculosis program

The matter of getting funds for constructing an addition to the present sanatorium will be brought up again at the next Special Session of the State Legislature

### CONNECTICUT

In Connecticut, the control of tuberculosis is divided between two state agencies The State Department of Health has the function of collecting information concerning morbidity and working cooperatively with the local health officer in an early discovery campaign The State Tuberculosis Commission, on the other hand, has control of the sanatoriums and also are carrying out a case finding program in those areas not covered by the local departments of health According to the report of Eugene E Lamoureux, MD, Director, Bureau of Preventable Diseases, through the cooperative efforts on the parts of both agencies, a very good tuberculosis control program has been established in Connecticut

During 1945-46, a new law was enacted for the purpose of dealing with the recalcitrant tuberculous patient "When it comes to the attention of a town, city or borough health officer or board of health of any city or borough that any person is afflicted with tuberculosis and is a carrier of such disease, and is unable or unwilling to conduct himself and to live in such manner as not to expose to danger of infection members of his family or household or other persons with whom he is associated, the health officer or board of health shall forthwith investigate the circumstances alleged If such health officer or board of health finds that any such person is a menace to others, a complaint may be lodged against such person by such health officer or board of health with the probate court for the district in which such town, city or borough is situated, and on such complaint such person shall be brought before such court The judge of such court, after due notice and hearing, if satisfied that such complaint is well founded and that the person is a source of danger to others, may commit him to an isolation hospital or other proper place which is provided by the local health officer or by the state department of health pursuant to section 2375, there to be received and kept for a period of not less than sixty days At the time of such commitment, such judge shall make such order for payment for the care and maintenance of such person as he deems equitable, but no patient who desires treatment by prayer or spiritual means, in the exercise of religious freedom, shall be subject to isolation or detention as provided for in this section, except that he may be isolated or quarantined in his own home and shall comply with the sanitary code of the state At the termination of the period of commitment, the medical officer in charge of such hospital or other place provided for the care of such person shall submit a detailed report to the local health officer or board of health signing the original application, setting forth the condition of the patient and the communicability of the disease together with such recommendations as he deems advisable for the

further care and supervision of such person. Any person committed to any place or institution under the provisions of this section shall have the right to appeal to any court having jurisdiction for review of the evidence for which commitment was made."

The above law has been used by the local health officers in dealing with this problem. Difficulties have arisen, however, in setting up accommodations in institutions where such patients might be committed. In most instances, the local isolation hospital has been used for commitment purposes. Tuberculosis sanatoriums, not having the facilities, do not desire to take this type of patient as the disturbance he might cause tends to prompt others, who are willing to stay in the institution for their own benefit, to leave.

In addition to the legal measures, efforts are being made, through the use of federal and state funds for establishing as many programs as possible on a local level so that a continuous check may be kept of the population.

### FLORIDA

We have been informed by C M Sharp, M.D., Director, Bureau of Tuberculosis Control, Florida State Board of Health, that the state law enacted in 1939 gives broad powers to the State Board of Health which are applicable to tuberculosis. "The State Board of Health shall have power to make, adopt, promulgate, enforce, and from time to time, amend, and repeal, rules and regulations covering sanitation and quarantine as may be necessary for the protection of public health. The regulation so established shall be called and known as the Sanitary Code of the State of Florida. The Sanitary Code may deal with any matters affecting the security of life or health or the preservation and improvement of public health in the State of Florida."

Under the regulations of the State Board of Health, tuberculosis is defined as a communicable disease requiring compulsory reporting, and is subject to quarantine as long as specific organism is discharged.

Compulsory hospitalization may be carried out according to Regulation 25 of the Sanitary Code, which states: "When in the opinion of the health officer proper isolation or quarantine of an affected person, persons, carrier, or contact is not or cannot be effectively maintained on the premises occupied by such person or persons by methods designated by this code, he may remove or require the removal of such person or persons to a hospital or other proper place designated by him, or he may employ such guards or officers as may be necessary to maintain effective isolation or quarantine."

### IDAHO

In a communication received in March 1947, L J Lull, M.D., Director, Local Health Service, Department of Public Health, reports that the first State Tuberculosis Hospital will be opened in Idaho in the near future. It will be located at Gooding, Idaho.

Up to the present time, tuberculosis patients have been hospitalized in two private hospitals in the State under a plan in which the State Health Department and the County of residence of the patient each contribute half the support of such patient. In the past, facilities and budget have been very limited. It is anticipated that with the inauguration of the new program, adequate care can be given to all patients with

tuberculosis According to standing arrangements, tuberculous patients will be accepted for treatment at the State Tuberculosis Sanatorium regardless of the place of residence in the State

### IOWA

Information received from Walter L. Blerring, M.D., Collaborating Epidemiologist and Health Commissioner of Iowa, shows that a new law for the isolation of tuberculous patients was instituted in 1946 as a part of the Rules and Regulations of the Iowa State Department of Health.

Isolation can be applied to patients who refuse sanatorium treatment by placarding their homes. The same rule applies to the patient who returns from a sanatorium before treatment has been completed, also to the open case of pulmonary tuberculosis (one with positive sputum) when the patient does not conform with the restrictions of the State Department of Health or local Board of Health in matters relating to the protection of others against the disease. The regulation applies only to patients who are a distinct menace to the public through failure to cooperate in the observance of health precautions.

### MARYLAND

The present status of the tuberculosis control program is well portrayed in the communication of C. H. Halliday, M.D., Chief and Epidemiologist, Bureau of Communicable Diseases, State Department of Health. No new legislation has been enacted by the State during 1945 and 1946. However, an ordinance was passed by the Baltimore City Council in June 1945, which authorized the Commissioner of Health of Baltimore City to adopt regulations necessary to govern the medical care or quarantine and isolation of persons having certain specified diseases, tuberculosis included, which are in a communicable stage. Interestingly, no attempt has been made as yet to utilize the powers granted in this ordinance as far as tuberculosis is concerned.

There are no plans for asking for legislation which would make possible the compulsory quarantine and isolation in sanatoriums of persons with communicable forms of tuberculosis. It is felt that legislation of this type would do little, at least at this time, to solve the tuberculosis problem. According to Halliday, it is preferable to secure voluntary hospitalization through the use of the educational means which are available.

In Maryland, a continued decline in the tuberculosis death rate has been recorded during 1945 and 1946. The preliminary estimate of tuberculosis death rate per 100,000 population for 1946 is 57.2 to a rate of 64.5 for 1944. The State Health Department expanded its case finding program through the purchase of five 70 mm. photofluorographic units and by increasing the number of chest clinics held in the counties. The ratio of new cases reported as compared with deaths has remained fairly constant. It has averaged slightly more than three cases per annual death.

Three of the photofluorographic units have been placed in the following general hospitals: the Johns Hopkins Hospital, the University Hospital and the Baltimore City Hospital, where they are used to take routine chest photofluorograms of both in-patient and out-patient admissions. The remaining two photofluorographic units are being used, one for general surveys in the counties of Maryland, and one for similar surveys in Baltimore City.

There is an urgent need for an increase in the available hospital beds for tuberculous patients and also, for suitable means for relieving the financial difficulties of the families of the tuberculous. Bills are before the Maryland Legislature which would expand the present institutional facilities and authorize the transfer of the control of the four state operated sanatoriums to the State Board of Health. The sanatoriums at the present time are operated by an independent Sanatorium Commission.

### MISSISSIPPI

A brief resume of the tuberculosis situation has been sent to us by C. C. Smith, M.D., Supervisor, Tuberculosis Control Unit, State Board of Health. There have been no state laws for tuberculosis enacted during 1945 or 1946 and no laws are contemplated at this time. Little is being done concerning quarantine enforcement and institutional isolation. The handicaps are in this respect a lack of beds for forcible isolation and the lack of funds to enforce quarantine. Appropriations are available for the construction of a 200 bed institution for colored tuberculous patients. The case finding program has been intensified during the past two years. There are two mobile photofluorographic units in operation, with plans for three more within the next two years. All of the 65 full time county health departments of Mississippi have diagnostic x-ray equipment in the health center.

### MISSOURI

We have received a detailed report from Herbert S. Miller, M.D., Director, Tuberculosis Service of Missouri. As a summary of this and of a review of the Missouri Children's Code and the Missouri Public Health Manual, we can offer the following information.

The major legislative change during 1945 and 1946 involved the creation of a Department of Public Health and Welfare. Under the new law defining the functions of the Division of Health, the latter assumes the responsibility for the administration of the State Tuberculosis Sanatorium through its Section of Local Health and Hospital Administration. It is emphasized that effective anti-tuberculosis activity is intimately associated with effective local health work. There are adequate rules and regulations in effect but the local officials (prosecuting attorneys and the local constabulary) tend to be timid in taking action under such rules and regulations. No thought is being given to enforced institutional isolation on account of the limited institutional facilities. The requests for sanatorium beds exceed that which are available. A great deal of emphasis is laid on the importance of the education of the public in public health matters, with particular reference to the communicability of tuberculosis. The State Health Department makes every effort in promoting the acceptance of sanatorium treatment by the patient voluntarily rather than through enforcement of the law. "We have not been willing to take any action which will permit the sanatorium to be identified with anything other than the idea of a chest hospital. The identification of the sanatorium with ideas of police functions will defeat the purpose of our present educational efforts."

Photofluorographic surveys are to be instituted in the near future and plans are formulated for further expansion of tuberculosis institutions, diagnostic and pneumothorax clinics, rehabilitation and follow-up services.

## MONTANA

Arthur E Rickli, M.D., Director of Tuberculosis Control, State Board of Health of Montana, has informed us that two pieces of legislation were passed in Montana in 1947. The first bill aims at making hospital facilities available for Montana Indians having tuberculosis. The second was part of the bill for post-war planning in which \$400,000 were made available to the State Sanatorium for the creation of more beds. In 1945, legislation was passed which established the Division of Tuberculosis Control in the State Board of Health.

## NEBRASKA

Through the cooperation of E. A. Rogers, M.D., Director, Tuberculosis Survey, Montana Department of Health, we have obtained an up-to-date report on the tuberculosis situation in Nebraska. There have been no laws enacted relative to tuberculosis during 1945 and 1946. Nebraska has no statutes for enforced institutionalization, isolation or quarantine of the tuberculous. No such laws are contemplated for the immediate future. The Tuberculosis Control Division operates one photofluorographic unit, making surveys of the general population, one county at a time. During the two years it has been in operation, most of the state institutions, war plants and colleges have been surveyed also. There is a central tuberculosis registry. Public health nurses carry on follow-up of the known cases, contacts and suspects discovered on surveys. Also extensive educational activities are carried out by the Tuberculosis Control Division in association with voluntary health agencies and the Division of Public Health Education of the State Health Department. Attempts are being made to encourage taking routine chest roentgenograms in general hospitals. The State is assisting in the purchase of equipment in some cases. Rehabilitation of the tuberculous patient is handled by the State Department of Vocational Rehabilitation.

## NEW HAMPSHIRE

According to the information received from George F. Campana, M.D., Acting Director, Communicable Disease Control, there was no change made in the state laws concerning tuberculosis during the years 1945 and 1946. State laws covering general communicable diseases have been interpreted so that it is possible to impose quarantine or to require enforced institutional isolation of the tuberculous. However, it is very seldom that such actions are deemed necessary and practicable. Education and persuasion normally prove sufficiently effective to eliminate situations that are a distinct menace to public health. State laws will not permit any mandatory procedures, except where the general public health is clearly endangered. Routine chest x-raying is practically nonexistent in New Hampshire. Mass surveys are carried out by the State intermittently, without a consistent program.

Current plans include the following: (1) A central register of all cases to be maintained in the State Health Department. This will permit a more adequate interchange of information between interested agencies and will prevent lapse of follow-up on cases. (2) Routine chest x-ray examinations for case finding purposes. (3) Employment of a medical social work consultant so as to improve service to families of tuberculous persons, to patients and to former patients.



## NEW YORK

William Siegal, M.D., Director, Tuberculosis Case Finding, Department of Health, reports the adoption of a law on April 24, 1946 which makes available facilities for diagnosis, care and treatment of tuberculosis without cost. Voluntary payments are accepted, but no state, county or other public official is permitted to request or require such payments or make any inquiry or investigation for the purpose of determining the ability of such person or of his legally responsible relatives to pay therefor.

At the present time there are 44 public tuberculosis hospitals in the State of New York, with a capacity of 9,471 beds. Of these hospitals, 13 with a capacity of 4,431 are operated by the city of New York, where there is a recognized need for additional facilities.

In the Governor's message of March 4, 1946 it is stated that "We propose, therefore, that you designate an Inter-Departmental Health Council composed of the Commissioners of the State Department of Health, Social Welfare, Mental Hygiene and Education who, with the assistance of the Chairman of the Health Preparedness Commission, should assist in formulating and through the various departments placing in operation the methods necessary to carry out a comprehensive health program."

This concept deserves due consideration by those whose responsibility it is to conduct an effective anti-tuberculosis campaign through public health agencies.

## VIRGINIA

We have been informed by L. J. Roper, M.D., State Health Commissioner of Virginia, that a new Act was added to the Code of Virginia on March 26, 1946, which pertains to tuberculosis control, as follows:

"What acts of tubercular persons to constitute a misdemeanor, penalty. Any person who has tuberculosis in the communicable form who, after having been instructed in writing by the local board of health or health officer or superintendent of any sanatorium of the State to take precautions, which are set forth in such writing to protect the members of his household and the public from being infected by tuberculosis communicated by such person, wilfully refuses to follow such instructions shall, upon proof that same are proper and necessary in the interest of the public health, be guilty of a misdemeanor and upon conviction thereof may be confined in such place as the court may designate, for a term not exceeding six months, in addition, any such person may be required upon his release to post a bond with the court in the amount of not exceeding one hundred dollars conditioned upon his proper performance of such precautions."

Relative to the progress in the tuberculosis control program, plans are in the formative stage for case-finding and the necessary follow-up, which includes isolation of open cases and treatment of all cases in close cooperation with private practitioners.

## WISCONSIN

Through the courtesy of Allan Filek, M.D., Director, Division of Tuberculosis, State Board of Health, we have received a copy of the amended laws relating to the admission of tuberculous patients to specialized institutions. The cardinal feature of the new law is free sanatorium

treatment of all tuberculous patients, regardless of their financial means We are quoting part of this law which became valid on May 4, 1945 "If any such patient shall be the beneficiary of a policy of hospitalization, health or accident insurance or other contract covering care in a tuberculosis sanatorium, he shall be liable to pay the cost of his care to the extent of the liability on such policy, insurance or contract as determined by the admitting court, except that such liability shall not include amounts payable as disability benefits under any such policy Any such patient who, by reason of his tuberculosis, is entitled to damages or workmen's compensation, shall be liable for the cost of his care to the extent that the same may be recoverable in an action or workmen's compensation proceedings, and may be required to execute all necessary papers and do all necessary acts to insure the collection thereof Nothing contained in this subsection shall prohibit any patient from paying all or a part of the cost of his care if he so desires "

Andrew L. Banyai, M.D., *Chairman*

### Report of the Committee on Certification

Dr J Winthrop Peabody reported progress in the efforts of the Committee on Certification to obtain an American Board of Diseases of the Chest The Board of Regents authorized the Committee to continue its efforts toward obtaining this board at the earliest possible date

### Report of the Board of Examiners

The Board of Examiners reported that 72 candidates for Fellowship in the College had taken their oral examination that morning and were now taking their written examination This is the largest class to appear for Fellowship examinations in the College

### Report of the Council on Pan American Affairs

Dr Chevalier L Jackson, Chairman of the Council on Pan American Affairs announced that a large delegation of physicians from the Latin American countries were attending the meeting and that an International Dinner had been arranged for that evening at the Ambassador Hotel Dr Jackson also announced that a breakfast meeting of the members of the Council on Pan American Affairs would be held on Sunday morning, June 8th

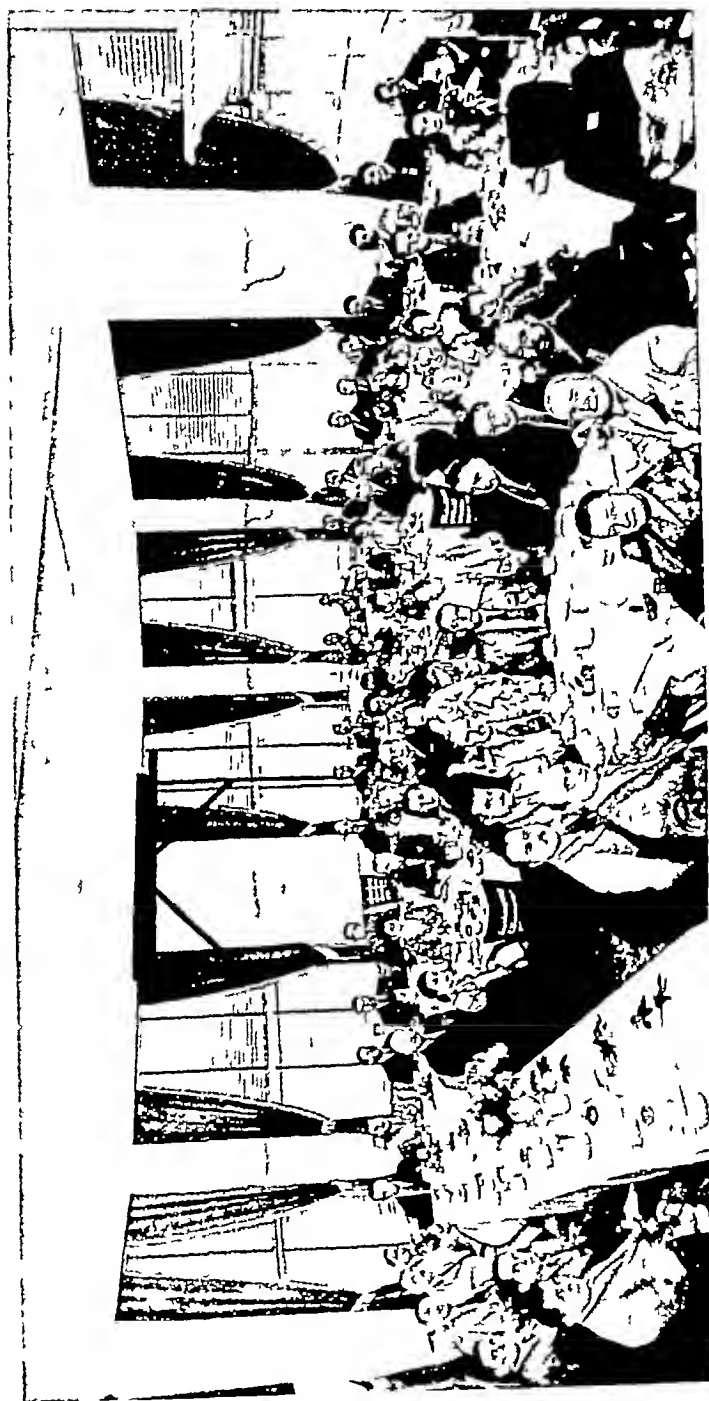
### Report on the Council on European Affairs

The Council on European Affairs has continued to carry out its established threefold policy during the past year (1) Building up new contacts with qualified specialists in diseases of the chest for the mutual advancement of scientific interests (2) Serving as an exchange post of information pertaining to this specialty and to health problems, in general (3) Functioning as a news bureau for the purpose of gathering data which deal with the health situation in Europe and with subjects of related interest The results of these efforts are being presented at this time in the form of a summary so as to offer a purview of events which have a direct or indirect bearing on the progressive endeavors of the College

The general European health situation presents a rather gloomy picture Periodic reports of the press and the observations of individual

## INTERNATIONAL NIGHT DINNER, ANNUAL MEETING, AMERICAN COLLEGE OF CHEST PHYSICIANS

AMBASSADOR HOTEL, ATLANTIC CITY, NEW JERSEY, JUNE 5, 1947



Seated at speakers table left to right Drs Reyes, Martinez, Acosta Velarde, and Colon, Puerto Rico Drs Macchiavello and Espinoza Galarza, Peru Drs Agullar, Chatas and Albertal Argentina Dr Alarcon Mexico Dr Jackson, Philadelphia Dr Warren Chairman, San Francisco Dr Maurer, Switzerland Dr Banyai, Milwaukee Dr Fan, China Dr Canizares Philippine Islands Dr Mugdaltchian Lebanon, Dr Carrizo, Panama Dr Herradora, Jersey City Drs Alderegula and Mendoza Cuba Drs Alvarado and Alonso Mexico, Dr Pauzner Palestine and Dr Sankara Iyer, India

medical men attest uniformly to this fact. As an illustration, it may be of interest to refer to some of the available commentary. According to the findings of Dr. Ernest L. Stebbins of Johns Hopkins University, who made a survey of health conditions in Europe in 1946, the situation is desperate. A great many of the health institutions, including sanatoriums, are largely destroyed. As a consequence of this and of the starvation and other ravages of the war, in Poland and Greece the tuberculosis death rate has increased by 400 per cent as compared with pre-war levels. In Poland, 17 per cent of the medical students have active tuberculosis. As a welcome measure of rehabilitation, the UNRRA has completely equipped 28 hospitals representing a bed capacity of 26,000.

Your Council is following with alert attention the transactions of the United Nations at Lake Success. It has been with interest to note several items.

The French representative proposed the establishment of international research laboratories for the prevention and cure of disease. It is a reasonable assumption that due share of the available funds and facilities will be assigned to the tuberculosis problem. It behooves the College to offer its moral support to this project and closely to follow further developments in this regard. We believe that it is an opportune time for the Board of Regents to delegate a special committee for maintaining an effective liaison with the Interim Commission of the World Health Organization and later on, with its permanent successor. The Interim Commission of the World Health Organization is headed by Dr. Andrija Stampar of Yugoslavia. It meets every four months. Most likely, the permanent headquarters of this organization will be in Geneva, Switzerland. Its constitution was signed by 61 nations and its work is financed by the United Nations. A budget of \$1,000,000 was adopted for 1947. It will direct the functions of intergovernmental health agencies and takes over the sphere of activities of the League of Nations Health Organization and of L'Office International de Hygiene Publique. It will assume the epidemiological intelligence functions of the health divisions of the UNRRA and integrate the Pan-American Sanitary Bureau as a regional office.

As to the spirit and general concept of this undertaking, it is well to refer to the thoughts expressed by Dr. Parran, the Surgeon General of the United States Public Health Service. "The nations represented here today are signing a Magna Carta for health which will bring into being a world health organization unique in its scope, authority and functions. Its broad purpose is the attainment by all peoples of the highest possible level of health and well being. We are convinced that health is not merely the absence of disease or infirmity but a state of complete physical, mental and social well being—the enjoyment of which we declare to be a fundamental right of every human being without distinction of race, religion, political belief or economic or social condition. We believe its attainment is essential for peace and security."

"While the responsibility for health within its own borders is of primary concern to each nation, the success of each can be greatly enhanced through international teamwork. The world health center we are creating, therefore, should be the directing and coordinating agency to provide information, leadership and assistance in every phase of health work. Not only will the organization aid in disseminating and applying all the scientific knowledge we now possess to prevent disease and pro-

mote health, but it will encourage and conduct scientific research to forge more effective tools. Better remedies will be discovered. New preventives will be found."

"To help reach these goals not only do we need to apply all the knowledge we now have for prevention, treatment and control of diseases everywhere in the world but we need to conduct intensive research in the laboratory, at the bedside and in the field to push back the frontiers of the unknown in health sciences."

In harmony with such ideals, the suggestion was made to initiate an international exchange of scientific information and workers and to arrange periodic research conferences. Moreover, very much along the aims of the College, the creation of world-wide scientific societies was advocated in accordance with the original plans of the International Institute of Intellectual Cooperation formerly under the League of Nations. It is with permissible pride and satisfaction to point to the fact that the American College of Chest Physicians since its inception has been sponsoring such a project. As a matter of fact, the tireless endeavors of various Councils under its jurisdiction as well as of your officers have brought about concrete proof of success in this regard. When you see, as today, at your annual convention, Fellows of the College from Australia, the Philippine Islands, China, from a number of South American countries, Mexico, Cuba, Canada, Switzerland, Yugoslavia and from other distant lands, we cannot but say that our efforts have not been in vain.

A resolution of no less significance introduced at Lake Success, as far as our work is concerned, was that which covers the establishment of a world statistical congress.

Since the last annual convention of the College, thirteen applications for membership have been accepted from Belgium. Thus, in addition to the already well-functioning Greek Chapter, with four Fellows and eleven Associate Members, we have firmly established strongholds in the medical domain of Europe, represented by Fellows in Norway, Portugal, Italy, Switzerland and Yugoslavia.

According to information received in Belgium, 32 sanatoriums for the treatment of tuberculosis are affiliated with or owned by a private organization, the Belgian National Organization for Defense Against Tuberculosis. In addition, it collaborates with 130 dispensaries staffed by 225 physicians and 254 visiting nurses.

Reports are becoming available from The Netherlands relative to the tremendous increase in the incidence of tuberculosis in adults due to malnutrition and lack of facilities for the isolation of communicable forms of tuberculosis during the war. There is a noteworthy point in the recorded statistical observations: whereas before the war the incidence of bovine tuberculosis in children was 96 per cent, during the war years it was only 18 per cent. This can be readily explained by the unavailability of milk for consumption due to depletion of the herds by the invading enemy.

As a regrettable, nay, tragic consequence of the war, the death rate from tuberculosis is approximately three times greater in France than in the United States. Since June 1946, a nation-wide anti-tuberculosis campaign has been in effect in France. Through central directives as to general principles, various districts of the country organize their efforts through, (1) "aeriums," centers for exposed children and those

exposed to tuberculosis, (2) preventoriums for patients with recent primary tuberculosis who are sputum negative, or who have erythema nodosum of tuberculous origin, or serofibrinous tuberculous pleurisy with effusion, (3) sanatoriums for the treatment of active cases of tuberculosis, (4) institutions for after-care and rehabilitation. Every patient with active tuberculosis is sent immediately to a sanatorium, without waiting for decision regarding questions of who will be financially responsible for the cost. According to a new law, the tuberculous patient is entitled to one-half of his salary if single and to two-thirds if he has dependents. During the period of his rehabilitation, all his incidental medical expenses are paid, together with complementary benefits, according to his earning capacity. Even when completely rehabilitated, medical expenses connected with the patient's former disease are covered from public funds. Some of these provisions which aim at the prevention of economic pauperization of the patient and his family may serve as useful models for future planning in most of our States.

In Turkey, the number of sanatorium beds and dispensaries are far below current needs. In all, there are only 1,500 beds available for the tuberculous. The tuberculosis mortality rate in large cities is 150-200 per 100,000 and in rural communities, 80-100. The Society for the Prevention of Tuberculosis of Istanbul is carrying on heroic attempts for establishing more sanatoriums and dispensaries.

It is with genuine pleasure to inform you that recently, Professor Lopo de Carvalho of Lisboa, Portugal, has been admitted as a Fellow to the College. His outstanding research work and numerous contributions to the medical literature in the form of scientific papers and books are well known. He is President of the International Union Against Tuberculosis. His attendance and participation in the transactions of this annual meeting have been planned for some time. Unfortunately, circumstances beyond control prevented the materialization of this thought. We are confident that it will be possible to have him on our scientific program next year.

We are proud to announce the steady increase in our membership in Switzerland.

As a reflection on the aforementioned matters, we believe that the Fellowship of the College should take active interest in the reorganization of the International Union Against Tuberculosis which is in progress at the present time. No scientific session of the Union has been held since 1937. It seems desirable that the College should be well represented in its scientific activities.

Recently a new scientific organization has been formed under the name of American-Swiss Foundation, with headquarters at Montclair, New Jersey. Its chief aim is to arrange exchange lecture tours for scientists of the two countries.

A noteworthy development in our progress with European contacts is a subscription to the "Diseases of the Chest" by the Karolinska Institute of Stockholm, Sweden, since March 1946.

Also, we wish to call your attention to newly established exchange relations between the College journal on the one hand and the *Archiva Medica Belgica*, the publication of the Association of Medical Scientific Societies of Belgium and *Medicine et Hygiene* of Geneva, Switzerland, on the other hand.

Statistical reports of the UNRRA and of the Interim Commission of the United Nations Health Organization are currently kept in the files of this Council and are available through the Executive Office of the College

Through more intimate contact with qualified specialists of Europe interested in chest diseases, we anticipate gaining access to hitherto unavailable scientific data. No efforts will be spared in gathering information for the perusal of College members concerning such items as various tuberculosis control systems, number and types of tuberculosis institutions, diagnostic and therapeutic methods applied in diseases of the chest, nutritional surveys, matters pertaining to medical education and various aspects of experimental and clinical research work pertaining to the specialty of chest diseases

We feel that with the moral support of the Fellowship of the College and particularly, with the cooperation of its European members, we shall accomplish the task assigned to this Council

Andrew L. Banyai, M.D., *Chairman*

## Report of the Council on Pan Pacific Affairs

Dr Harry C. Warren, Chairman of the Council on Pan Pacific Affairs reported a steady increase in College membership in the Middle and Far Eastern countries and that a number of members from those countries were present at this meeting. Dr Miguel Canizares, Governor of the College for the Philippine Islands, and Dr Lincoln Pan, delegate from China, have been invited to address the assembly at the International Dinner to be given tonight. Representatives from a number of other countries have also been invited to participate in the program.

The meeting was adjourned at 4 30 p m

## Second Session, Board of Regents

The Board of Regents convened for its second session on Sunday, June 8. Dr Placak, Chairman of the Board, called the meeting to order at 5 00 p m. Dr Gustave Maurer, Davos, Switzerland, and Dr Edward A. Greco, Portland, Maine, were introduced as new members to the Board of Regents.

Dr Paul A. Turner, Louisville, Kentucky, was elected as a member of the Executive Council to represent the Board of Regents.

Dr Carl H. Gellenthien, Valmora, New Mexico, was elected by the Board as a member of the Nominating Committee.

The following resolutions were introduced and adopted

### RESOLUTION

WHEREAS, The College membership has grown since the present By-Laws were adopted in 1942, and

WHEREAS, The activities of the College have been greatly expanded, THEREFORE,

BE IT RESOLVED, That the President of the College be authorized to appoint a committee of three or more members to review the present By-Laws and submit recommendations to the Board of Regents of the College for any necessary revision

## RESOLUTION

WHEREAS, It is the intent and purpose of the College to continually raise the standards of Fellowship in the College, and

WHEREAS, One of the important steps taken by the Board of Regents of the College to bring this about has been the establishment of a Board of Examiners, and

WHEREAS, There are numerous requests received at the Executive Offices of the College for a waiver of examinations for applicants applying for Fellowship in the College, and in order that proper machinery may be established for the handling of such requests,

THEREFORE, BE IT RESOLVED, That all applicants for Fellowship in the College shall be required to appear before the Board of Examiners for oral and written examinations, and

BE IT FURTHER RESOLVED, That such instances where a request for a waiver of examination has been received, such a request should first be submitted to the Governor of the College in the state wherein the applicant resides, and upon favorable recommendation of the Governor the request should be sent to the Regent of the College in the district wherein the applicant resides, and should the request be favorably received by the Regent, he in turn shall submit such a request in writing to the Chairman of the Board of Regents for final approval. The Chairman of the Board of Regents shall then notify the Executive Secretary of the College of the decision of the Board of Regents and the applicant shall be so notified by the Executive Secretary

## RESOLUTION

WHEREAS, The name of the Maryland-District of Columbia Chapter of the College does not include its membership in West Virginia, and

WHEREAS, The name "Maryland-District of Columbia Chapter" is a cumbersome one,

THEREFORE, BE IT RESOLVED, That the name of the Maryland-District of Columbia Chapter be changed to the "Potomac Chapter" of the American College of Chest Physicians

## RESOLUTION

WHEREAS, The officials and members of the New Jersey Chapter of the College gave unstintingly of their time to complete the arrangements for the Annual Meeting of the College in Atlantic City, and

WHEREAS, As a result of their efforts the College had the most successful meeting in its history, and

WHEREAS, The New Jersey and Pennsylvania Chapters of the College did their full share to entertain the visiting members and their families at a most successful cocktail party,

THEREFORE, BE IT RESOLVED, That the Board of Regents of the College give official recognition to these fine accomplishments and extend their thanks and appreciation to the members of the College in the New Jersey and Pennsylvania Chapters, and in particular to Dr Irving Willner, Chairman of the General Arrangements Committee for the meeting, and to Dr Paul K Bornstein and Dr Charles Hyman, who so ably assisted the Chairman in



completing the arrangements for the meeting It is directed that the Executive Secretary send a copy of this resolution to the officials of the New Jersey and Pennsylvania Chapters of the College, as well as to the physicians whose names are mentioned in this resolution

Other council and committee reports presented at the annual meeting will be published in future issues of the journal

## Annual Meeting, Board of Governors

The Board of Governors of the American College of Chest Physicians held its annual meeting at the Ambassador Hotel, Atlantic City, New Jersey, on June 5, 1947

The following Governors and Alternates registered for the meeting

Robert K Campbell, M.D, Springfield, Illinois, Chairman

Alabama	Kelle N Joseph, M.D, Birmingham
Arizona	Howell Randolph, M.D, Phoenix
Arkansas	David H Shipp, M.D, Little Rock (alternate)
California	Seymour M Farber, M.D, San Francisco (alternate)
Colorado	W Bernard Yegge, M.D, Denver (alternate)
Connecticut	Cole B Gibson, M.D, Meriden
Delaware	Gerald Beatty, M.D, Wilmington
Dist of Columbia	W LeRoy Dunn, M.D, Washington (alternate)
Florida	M Jay Flipse, M.D, Miami
Georgia	Carl C Aven, M.D, Atlanta
Idaho	Kenneth A Taylor, M.D, Gooding (alternate)
Indiana	Robert A Staff, M.D, Rockville
Kansas	Charles F Taylor, M.D, Norton (alternate)
Kentucky	T Ashby Woodson, M.D, Louisville
Maine	Edward A Greco, M.D, Portland
Maryland	Otto C Brantigan, M.D, Baltimore
Massachusetts	Hubert A Boyle, M.D, New Bedford
Michigan	Willard B Howes, M.D, Detroit
Minnesota	Karl H Pfuetze, M.D, Cannon Falls
Mississippi	Robert E Schwartz, M.D, Hattiesburg
Missouri	W W Buckingham, M.D, Kansas City
New Jersey	Martin H Collier, M.D, Grenloch
New York	George Foster Herben, M.D, Yonkers
North Carolina	Merle D Bonner, M.D, Jamestown
Ohio	D W Heusinkveld, M.D, Cincinnati
Oklahoma	Robert M Shepard, M.D, Tulsa
Pennsylvania	Ross K Childerhose, M.D, Harrisburg (alternate)
Rhode Island	U E Zambarano, M.D, Wallum Lake
South Carolina	R Kyle Brown, M.D, Greenville
Tennessee	David H Waterman, M.D, Knoxville
Texas	Elliott Mendenhall, M.D, Dallas (alternate)
Utah	William R Rumel, M.D, Salt Lake City (alternate)
Virginia	Dean B Cole, M.D, Richmond (alternate)
West Virginia	George R Maxwell, M.D, Morgantown
Wisconsin	Andrew L Banyai, M.D, Milwaukee
Wyoming	Carleton O Anton, M.D, Sheridan

*U S Government Services*

U S Army	Major General S U Marietta, Washington, D C
U S Navy	Comdr Sidney A Britten, Washington, D C
U S Public Health Service	Herman E Hilleboe, M.D , Washington, D C
U S Veterans Administration	Roy A Wolford, M.D , Washington, D C

*Other Countries*

Canada	A F Miller, M.D , Quebec
Philippine Islands	Miguel Canizares, M.D , Manila

Dr Campbell called the meeting to order and commented briefly on the fine response of all the Governors in replying promptly to correspondence concerning the objectives and accomplishments of the College Comments in all instances were fully appreciative of the objectives and showed real pleasure in the progress we have made and the many things we have accomplished

Suggestion of subjects for consideration at the annual meeting centered mainly around further work toward the eventual establishment of a Board on Diseases of the Chest and that more attention be given in our regular programs to non-tuberculous chest conditions Also, that all hospitals throughout the country be encouraged in every way to make a chest x-ray of all patients admitted

Our President, Dr Hendricks, spoke to the Governors present regarding the progress that had already been made toward eventual establishment of a specialty board Dr Hendricks spoke also on the desirability of the American Medical Association establishing a Section on Diseases of the Chest in the Scientific Assembly and the Board of Governors voted their unanimous approval of such a Section

Dr Hendricks gave details of progress that had been made by the research council in diseases of the chest which was established by resolution at the annual meeting of the Board of Regents one year previous Definite progress has been made but further work and continued support will, of course, be necessary

A resolution was passed that a committee be appointed to study the revision of the College By-Laws

The method of handling requests for waiver of Fellowship examinations was discussed in some detail and it was felt that this waiver seldom should be used but may be applied in exceptional cases

Dr Campbell was re-elected Chairman of the Board of Governors and Dr Hubert A Boyle was elected by the Board of Governors to the Nominating Committee

Meeting adjourned

## College Councils and Committees

### COUNCIL ON UNDERGRADUATE MEDICAL EDUCATION

*Term Expires*

Edward W Hayes M.D , Monrovia, California, Chairman	1950
Andrew L Banyai, M.D , Milwaukee, Wisconsin, Secretary	1949
William S Conklin, M.D , Portland, Oregon	1950
Louis L Friedman, M.D , Birmingham, Alabama	1949
C Howard Marcy, M.D , Pittsburgh, Pennsylvania	1948

Elliott Mendenhall, M.D , Dallas, Texas	1949
Nelson W Strohm, M.D , Buffalo, New York	1948
David Ulmer, M.D , New York, New York	1948
George A. Welchons, M.D , Richmond, Virginia	1950

*Editorial Committee*

BOOK\* "The Fundamentals of Pulmonary Tuberculosis and Its Complications" (For the Student, the Teacher and the Practicing Physician)

Edward W Hayes, M.D , Monrovia, California, Chairman  
 Andrew L Banyai, M D , Milwaukee, Wisconsin  
 Herman E Hilleboe, M D , Albany, New York  
 Jay Arthur Myers, M.D , Minneapolis, Minnesota  
 J Winthrop Peabody, M.D , Washington, D C

*Editorial Committee*

BOOK\* "Non-Tuberculous Diseases of the Chest"

Andrew L Banyai, M.D , Milwaukee, Wisconsin, Chairman  
 Seymour M Farber, M.D , San Francisco, California  
 Alvis E Greer, M.D , Houston, Texas  
 Edward W Hayes, M.D , Monrovia, California  
 Charles M Hendricks, M.D , El Paso, Texas  
 Minas Joannides, M.D , Chicago, Illinois  
 Jay Arthur Myers, M D , Minneapolis, Minnesota  
 George G Ornstein, M.D , New York, New York  
 J Winthrop Peabody, M.D , Washington, D C

\*These books are being published by Charles C Thomas, Springfield, Illinois

## COUNCIL ON POSTGRADUATE MEDICAL EDUCATION

	<i>Term Expires</i>
J Winthrop Peabody, M.D , Washington, D C , Chairman	1949
Frank R Ferlano, M.D , New York, New York, Secretary	1949
Seymour M Farber, M.D , San Francisco, California	1949
Alvis E Greer, M.D , Houston, Texas	1948
Chevalier L Jackson, M.D , Philadelphia, Pennsylvania	1948
Edwin R Levine, M.D , Chicago, Illinois	1950
I L Robbins, M.D , New Orleans, Louisiana	1950
Lawrence M Serra, M.D , Baltimore, Maryland	1950
W Bernard Yegge, M.D , Denver, Colorado	1948

## COUNCIL ON PUBLIC HEALTH

	<i>Term Expires</i>
Paul A Turner, M.D , Louisville, Kentucky, Chairman	1949
Francis J Weber, M.D , Washington, D C , Secretary	1950
Sidney A Britten, Comdr, U.S.N , Washington, D C	1948
John B Grow, M.D , Denver, Colorado	1948
W H Hatfield M.D , Vancouver, B C , Canada	1949
Herman E Hilleboe, M.D , Albany, New York	1950
Robert G McCorkle, M.D , San Antonio, Texas	1950
Walter E Vest, M.D , Huntington, West Virginia	1949
Roy A Wolford, M.D , Washington, D C	1948

*Committee on Chest Diseases in Penal and Mental Institutions\**

Otto L. Bettag, M.D., Pontiac, Illinois, Chairman  
 B. B. Bagby, Jr., M.D., Martinsburg, West Virginia  
 G. C. Bellinger, M.D., Salem, Oregon  
 H. A. Burns, M.D., St. Paul, Minnesota  
 George M. Curtis, M.D., Columbus, Ohio  
 J. George Lang, M.D., New York, New York  
 A. A. Leonidoff, M.D., Poughkeepsie, New York

*Committee on Occupational Diseases of the Chest\**

Louis Mark, M.D., Columbus, Ohio, Chairman  
 Leopold Bradhy, M.D., New York, New York  
 William P. Chester, M.D., Detroit, Michigan  
 Frank R. Ferlino, M.D., New York, New York  
 J. V. Foster, M.D., Harrisburg, Pennsylvania  
 R. L. Laney, M.D., Joplin, Missouri  
 Nelson W. Strohm, M.D., Buffalo, New York  
 William F. Wagner, M.D., San Francisco, California  
 W. Bernard Yegge, M.D., Denver, Colorado

\*The Committees on Chest Diseases in Penal and Mental Institutions and Occupational Diseases of the Chest serve under the Council on Public Health

## NATIONAL COUNCIL OF TUBERCULOSIS COMMITTEES

	<i>Term Expires</i>
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Maurice Campagna, M.D., New Orleans, Louisiana	1948
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D. W. Heusinkveld, M.D., Cincinnati, Ohio	1948
J. Karl Poppe, M.D., Portland, Oregon	1950
Rufus A. Schneiders, M.D., San Diego, California	1949
Darrell H. Trumpe, M.D., Springfield, Illinois	1949

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\*The Committees on Sanatorium Standards and Rehabilitation serve under the Council of Medical Directors and Superintendents of Tuberculosis Hospitals and Sanatoria

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\*The Committees on Surgical Treatment of Diseases of the Chest, Non-Surgical Collapse Therapy, and Chemotherapy and Antibiotics serve under the Committee on Management and Treatment of Diseases of the Chest

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H Orrego Puelma, M.D , Santiago, Chile  
Arthur Q Penta, M.D , Schenectady, New York  
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Lincoln Pan, M.D , Shaoshing, China  
Li Shu Fan, M.D , Hong Kong, China



## SEMI-ANNUAL MEETING, BOARD OF REGENTS

The Semi-Annual Meeting of the Board of Regents of the College will be held at the Statler Hotel, Washington, D C, on Saturday, Nov 22

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ANNOUNCEMENT

The Board of Examiners plans to conduct the next oral and written examinations for Fellowship in the American College of Chest Physicians at Washington, D C, November 21, 1947 The oral examinations will be conducted in the morning and the written examinations will be held in the afternoon Only physicians whose applications for Fellowship have been approved by the Board of Regents will be eligible for this examination If you desire to take the examination, please write to the Executive Secretary, 500 North Dearborn Street, Chicago 10, Illinois

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College Chapter News

## POTOMAC CHAPTER

The Fourth Bi-Annual Meeting of the Potomac Chapter of the College will be held in the District of Columbia Medical Society Building at 1718 "M" Street N W, Washington, D C, on Sunday, October 5, 1947, at 1 00 p m

1 00 p m Registration

2 00 p m Scientific program as follows

"Recent Trends in the Surgical Therapy of Pulmonary Tuberculosis," Herbert C Maler, M D, New York, New York

"Etiology of Hemoptysis Associated with a Negative Plain Chest X-ray," Osler A Abbott, M.D, F C C P, Atlanta, Ga

"The Role of Inhalation Therapy in the Management of Bronchiectasis," Arthur M Olsen, M.D, Rochester, Minn

"Postmortem Pneumothorax,"

David Salkin, M D, F C C P, Hopemont, West Virginia

"The Cytology of Bronchial Secretions in Carcinoma of the Lung," Peter A Herbut, M.D, Philadelphia, Pennsylvania

5 15 p m Short business meeting, following the scientific program at D C Medical Society Building

6 00 p m Cocktail Party, Mayflower Hotel

6 30 p.m Dinner, Mayflower Hotel

8 00 p m X-Ray Conference at which interesting x-ray films will be presented, Mayflower Hotel

## SOUTHERN CHAPTER

The Fifth Annual Meeting of the Southern Chapter, American College of Chest Physicians, will be held at the Sheraton Belvedere Hotel, Baltimore, Maryland, on Sunday, November 23, and Monday, November 24. The Southern Medical Association will meet in Baltimore on November 24-27, 1947.

The program for the meeting of the Southern Chapter of the College will be as follows

*Sunday, November 23, Sheraton Belvedere Hotel*

1 00 p m Registration

2 00 p m Scientific Session

"An Evaluation of Planigrams in Pulmonary Tuberculosis,"  
Walter L. Nalls, M.D., F.C.C.P., and  
Philip Morgenstern, M.D., F.C.C.P., Oteen, North Carolina

\*"The Technique of Rapid Culture of Tubercle Bacilli,"  
Rene DuBos, Ph.D., New York, New York

"The Clinical Application of Topographical Anatomy of the  
Bronchi and Lungs,"  
Chevalier L. Jackson, M.D., F.C.C.P., Philadelphia, Pa.

"Modern Methods in the Diagnosis and Treatment of  
Mediastinal Masses,"  
Osler Abbott, M.D., F.C.C.P., Atlanta, Georgia

*Monday, November 24, Sheraton Belvedere Hotel*

8 30 a m Registration

9 00 a m Scientific Session

"The Diagnosis of Bronchogenic Carcinoma by Sputum  
Examination,"  
Thomas H. Burford, M.D., St. Louis, Missouri

"Bronchography Made Easy,"  
Duane Carr, M.D., F.C.C.P., Memphis, Tennessee

"Streptomycin Protection in the Surgical Treatment of  
Tuberculosis,"  
Brian B. Blades, M.D., F.C.C.P., Washington, D. C.

\*"Tuberculosis and Pregnancy,"  
Hollis E. Johnson, M.D., F.C.C.P., Nashville, Tennessee

12 30 p m Luncheon Meeting

Panel Discussion "Lung Abscess"

Louis A. M. Krause, M.D., Baltimore — *Medicine*,  
Otto C. Brantigan, M.D., F.C.C.P., Baltimore — *Surgery*,  
Donald Proctor, M.D., Baltimore — *Endoscopy*

Business Meeting

Election of Officers

2 00 p m Scientific Session

Papers on chest diseases to be delivered before the Southern  
Medical Association

6 00 p m Cocktail Party

## 7 00 Annual Banquet

President's Address,

Paul A Turner, M.D , F C C.P , Louisville, Kentucky,  
President, Southern Chapter, American College of Chest  
Physicians

Guest Speaker,

Alfred Blalock, M.D , Baltimore, Maryland,  
"The Surgical Treatment of Coarctation of the Aorta "

## 8 45 p m X-Ray Conference

Charles P Cake, M.D , F C C.P , Washington, D C ,  
Moderator

*Note* All scientific papers will be open for discussion from the floor,  
discussions to be limited to five minutes each Those wishing to show  
films at the X-Ray Conference need not notify the moderator before  
the meeting Wide participation is invited

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\*Acceptance and Exact Title not Confirmed

*Program Committee*

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Dean B Cole M.D , Richmond, Virginia

Herbert L Mantz, M.D , Kansas City, Missouri

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E Howard Tonolla, M.D , Baltimore, Maryland

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Mrs William Rienhoff, Jr , Baltimore, Maryland, Chairman

Mrs Lawrence Serra, Baltimore, Maryland

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ILLINOIS CHAPTER

There will be a joint meeting of the Illinois Chapters of the American  
Trudeau Society and the American College of Chest Physicians held at  
the Abraham Lincoln Hotel, Springfield, Illinois, on October 2 The fol-  
lowing program will be presented

- 2 00 p m Arthur S Webb, M.D , F C C.P , Glen Ellyn, Illinois, presiding  
"The Need for Periodic X-ray Examination of Adult Chests,"  
Charles K Petter, M.D , F C C.P , Waukegan, Illinois  
Discussion opened by  
Clifton Hall, M.D , F C C.P , Springfield, Illinois

"The Role of Bronchoscopy in Diseases of the Chest,"  
D H Trumpe, M.D, F C C P, Springfield, Illinois

Discussion opened by

Stuart Broadwell, M.D, Springfield, Illinois

"Our Experience with Streptomycin and Summary of Present Status" (Including Movie if completed by that date),  
George H Vernon, M.D, F C C P, Springfield, Illinois

Discussion opened by

A E Steer, M.D, F C C P, Springfield, Illinois

"Limitations of Collapse Procedures,"

J A Stocker, M.D, F C C P, Springfield, Illinois

Discussion opened by

Loren L Collins, M.D, Edwardsville, Illinois

#### *Sangamon County Medical Society Regular Meeting*

6 00 p m Social period

6 30 p m Dinner

8 00 p m Guest Speaker,

"Tuberculosis in General Practice and the Specialties,"

Jay Arthur Myers, M.D, F C C P, University of Minnesota  
Medical School, Minneapolis, Minnesota

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#### PENNSYLVANIA CHAPTER

The Pennsylvania Chapter of the College will hold a business meeting and election of officers during the meeting of the Pennsylvania State Medical Society Meeting which begins on September 15 at Pittsburgh

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#### VENEZUELAN CHAPTER MEETING (ORGANIZED)

Caracas, Venezuela, May 20, 1947



Sitting (left to right) Drs Iturbe, Delgado, Gimenez, Overholt, Baldo, Criollo Standing (left to right) Drs Rodriguez, Pardo, Ortega, Montoya, Toro, Jaso, Principe, Estrada, Soules, Polack, Gonzalez, Fernandez Standing in back (left to right) Drs Valladares, Benshimol and Lozano

### MICHIGAN CHAPTER

The Michigan Chapter of the College will hold a dinner meeting on Tuesday evening, September 23, during the 82nd Annual Session of the Michigan State Medical Society, at Grand Rapids. A program will follow. Officers of the Michigan Chapter are: President, Arthur R. Young, M.D., Pontiac, Vice-President, William P. Chester, M.D., Detroit, and Secretary-Treasurer, C. J. Gollinvaux, M.D., Monroe.

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### NORTH MIDWEST CHAPTER

At the annual meeting of the North Midwest Chapter of the College, which was held at the Holland Hotel, Duluth, Minnesota, July 1, the following officers were elected for 1947-1948:

Sumner Cohen, M.D., Oak Terrace, Minnesota, President,  
John Allen, M.D., Omaha, Nebraska, Vice-President,  
Karl H. Pfuetze, M.D., Cannon Falls, Minnesota, Secretary-Treasurer

At the business meeting the matter of working toward the establishment of an affiliate board of diseases of the chest was discussed at some length. It was the consensus of the group that such a board would undoubtedly serve to improve the standards of diagnosis and treatment of chest diseases among the profession. The chapter went on record as favoring the establishment of more adequate residencies in medical schools and teaching hospitals for the training of men who wish to specialize in chest diseases.

The importance of streptomycin as an aid in the treatment of tuberculosis was discussed. The chapter felt that streptomycin has already established itself as a valuable adjunct in the treatment of certain types of tuberculosis, and that state, county and city sanatoria should make the drug available to those patients which experience to date has shown may be benefited by its use. A committee was appointed, consisting of Drs. Sumner Cohen, G. A. Hedberg, and Karl H. Pfuetze, to draft a statement to the effect that streptomycin is already established as a valuable weapon in the armamentarium against tuberculosis of certain types, and that sanatorium boards should make allowance for its purchase in future budgets. This statement is to be sent to sanatorium superintendents in the North Midwest Chapter area for presentation to their various boards in the hope that the sanatorium boards will be favorably influenced by the action of this chapter in recommending use of the drug in indicated cases.

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### ROCKY MOUNTAIN CHAPTER

The Rocky Mountain Chapter of the College held its annual meeting at the Hotel Shirley-Savoy, Denver, Colorado, September 16. The Colorado State Medical Society also met in Denver, September 17-20.

The following program was presented at the chapter meeting:

A. M. Mullett, M.D., F.C.C.P., Colorado Springs, Colorado,  
President, Rocky Mountain Chapter, Presiding

"Present Status of Aluminum Therapy in Silicosis,"

John Berry, M.D., Denver, Colorado

"The Future of Institutional Treatment of Pulmonary Tuberculosis"  
P J Sparer, M.D , F C C.P , Denver, Colorado

"Immobilization Therapy in Pulmonary Tuberculosis,"  
Alvan L Barach, M.D , F C C.P , New York, New York

"Psychosomatic Problems in Pulmonary Tuberculosis,"  
Charles M Hendricks, M.D , F C C.P , El Paso, Texas

"Symposium on Streptomycin in Pulmonary Tuberculosis,"  
Lt Col J B Wallace, Fitzsimons General Hospital  
Capt J S Greer, Fitzsimons General Hospital  
Lt M W Fisher, Fitzsimons General Hospital  
Daniel W Zahm, M.D , Fort Logan Hospital  
S A Adland, M.D , J C R S Sanatorium  
H M Van Der Schouw, M.D , Lutheran Sanatorium  
Ralph C Dwork, M.D , National Jewish Hospital

"Differential Diagnosis of Chest Tumors,"  
Fred R Harper, M.D , Denver, Colorado

"Surgical Treatment of the Round Focus of Pulmonary Tuberculosis,"  
John B Grow, M.D , F C C.P , Denver, Colorado

"Resume of Histoplasmosis,"  
Charles F Taylor, M.D , F C C.P , Norton, Kansas

"Present Status of B C G ,"  
P J Sparer, M.D , F C C.P , Denver, Colorado

There was also a luncheon meeting of the chapter at which the guest speaker, Dr Alvan L Barach, spoke on "Antibiotic Therapy in Pulmonary Tuberculosis"

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#### VIRGINIA CHAPTER

The following officers were elected at the Second Annual Meeting of the Virginia Chapter of the College, which was held at the Pine Camp Hospital, Richmond, on June 23rd

Dean B Cole, M.D , Richmond, President  
C L Harrell, M.D , Norfolk, Vice-President  
Charles W Scott, M.D , Burkeville, Secretary-Treasurer

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#### WISCONSIN CHAPTER

The Third Annual Meeting of the Wisconsin Chapter of the College will be held at the Schroeder Hotel, Milwaukee, on October 5 A scientific program will be presented, starting at 2 00 p m The program is as follows

Paul E Pifer, M.D , F C C.P , Kenosha, Chairman  
Douglas Guthell, M.D Milwaukee, Vice-Chairman

"Cardinal Manifestations of Interstitial Pneumonitis,"  
W A Douglas Anderson, M.D , Milwaukee  
Discussants John W Connell, M.D , Fon du Lac  
Emil Rothstein, M.D , F C C.P , Wood

"Differential Diagnosis and Treatment of Cystic Malformations of the Lung," W E Adams, M.D , Chicago, Illinois

Discussant George H Jurgens, M.D , F C C P , Milwaukee

"Pulmonary Adenomatosis,"

Frederick J Pohle, M.D , Madison

Discussant Stanley R Szymanski, M.D , Wood

"Diagnosis and Treatment of Laryngotracheobronchitis,"

George H Logan, M.D , Rochester, Minnesota

Discussant Karl E Kassowitz, M.D , Milwaukee

"Surgical Aspects of Heart Disease,"

Chester M Kurtz, M.D , Madison

Discussant Mischa J Lustock, M.D , F C C P , Milwaukee

"Recent Advances in the Treatment of Bronchial Asthma,"

Samuel J Taub, M.D , Chicago, Illinois

Discussant Richard P Jahn, M.D , Milwaukee

There will be a dinner meeting at 6 00 p m at which Dr Carl O Schaefer, Racine, Governor of the College for Wisconsin, will preside

At 8 00 p m an x-ray conference will be presented at which William T Clark, M.D , Janesville, Wisconsin, will preside X-ray films of unusual interest will be shown at this conference

#### POSTGRADUATE COURSE IN DISEASES OF THE CHEST

More than 100 inquiries were received regarding the Second Annual Postgraduate Course in Diseases of the Chest to be held at the Municipal Tuberculosis Sanitarium, Chicago, September 15-20 Due to the large number of physicians who expressed a desire to take this postgraduate course, the committee in charge of arrangements decided to increase the enrollment from 30 to 55, which is the maximum seating capacity of the assembly hall

The Council on Postgraduate Medical Education regrets that all of the applicants could not be accepted and it is hoped that these physicians will register for some of the other postgraduate courses to be given by the Council in the near future

The physicians who took the course came from 19 states, the District of Columbia, Canada and Mexico The following instructors participated in this Second Annual Postgraduate Course in Diseases of the Chest

ANDREW L BANYAI

Associate Clinical Professor of Medicine, Marquette University

ALVAN L BARACH

Associate Professor of Clinical Medicine, Columbia University

ALVIS E GREER

Clinical Professor of Medicine, Baylor University

JOHN B GROW

Thoracic Surgeon, National Jewish Hospital

PAUL H HOLINGER

Assistant Professor of Laryngology, Rhinology and Otology, University of Illinois College of Medicine

MINAS JOANNIDES

Assistant Professor of Surgery, University of Illinois College of Medicine

**LOUIS KATZ**

Director, Cardiovascular Department, Michael Reese Hospital

**EDWIN R. LEVINE**

Director of Chest Service, Michael Reese Hospital

**MILTON I. LEVINE**

Associate Professor in Pediatrics, Cornell University Medical College

**JAY ARTHUR MYERS**

Professor of Medicine and Public Health, Medical and Graduate Schools, University of Minnesota

**ARTHUR W. NEWITT**

Tuberculosis Control Officer, Municipal Tuberculosis Sanitarium

**GEORGE G. ORNSTEIN**

Associate Professor of Medicine, New York Medical College

**J. WINTHROP PEABODY**

Professor of Diseases of the Respiratory System, Georgetown University School of Medicine

**WILLIAM F. PETERSEN**

Director, Department of Clinical Research, St. Luke's Hospital

**KARL H. PFUETZE**

Medical Director, Mineral Springs Sanatorium

**WILLIS J. POTTS**

Professor of Surgery (Rush), University of Illinois College of Medicine

**LEO G. RIGLER**

Professor and Chief of the Department of Radiology and Physical Therapy, Medical and Graduate Schools, University of Minnesota

**SOL ROY ROSENTHAL**

Director, Tice Laboratory for BCG Vaccination, Chicago Municipal Tuberculosis Sanitarium and the University of Illinois

**OSCAR A. SANDER**

Studies in Occupational Disease and Industrial Case Findings

**JOHN P. SPIEGEL**

Chief, Psychiatric Clinic, Michael Reese Hospital

**HENRY C. SWEANY**

Medical Director of Research, Municipal Tuberculosis Sanitarium

**J. ROBERT THOMPSON**

Assistant Medical Director of Research, Municipal Tuberculosis Sanitarium

**GEORGE C. TURNER**

Staff Physician, Municipal Tuberculosis Sanitarium

**WILLIAM M. TUTTLE**

Thoracic Surgeon, Herman Kiefer Hospital

**LEON UNGER**

Associate Professor of Medicine, Northwestern University Medical School

**ITALO F. VOLINI**

Professor and Chairman, Department of Medicine, Loyola University School of Medicine

**GUY P. YOUNG**

Associate Professor of Bacteriology, Northwestern University Medical School

The Council appreciates the cooperation given by the Board of Directors and the staff of the Municipal Tuberculosis Sanitarium in the presentation of this course. The Council also commends Dr. Edwin R.



Levine, a member of the Council on Postgraduate Medical Education and Chairman of the Medical Education Committee of the Illinois Chapter, for arranging the course Dr Levine was ably assisted in arrangements for the course by the other members of his committee, Dr Paul H Hollinger, Dr Minas Joannides and Dr Arthur S Webb, ex officio

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## College News Notes

Nelson W Strohm, M.D, F C C P, Buffalo, New York, Regent of the College for New York State has been appointed full time director of Tuberculosis Control in the Buffalo Department of Health

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Arthur S Kimball, M.D, F C C P, formerly Medical Director, Oakland County Tuberculosis Sanatorium, Pontiac, Michigan, has been appointed Medical Director, Arthur S Kimball Sanatorium, Battle Creek, Michigan. He succeeds W Leonard Howard, M.D, who resigned to become Medical Director, Maybury Sanatorium, Northville, Michigan. The Arthur S Kimball Sanatorium, Battle Creek, Michigan, was named in honor of Dr Kimball's father

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Bernard Klein, M.D, F C C P, Joliet, Illinois, was awarded 3rd Prize by the Physicians' Literary Guild for his essay entitled "Velled Horizon". The Guild meets annually with the American Medical Association and physicians who are interested in their activities should communicate with Dr F H Redewill, 526 Flood Building, San Francisco, Calif, Secretary, American Physicians' Literary Guild

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Benjamin L Brock, M.D, F C C P, formerly Medical Director of the Waverly Hills Sanatorium, Waverly Hills, Kentucky, has resigned from the Veterans Administration and has opened offices in the Brown Building, Louisville, Kentucky, where he will confine his practice to the specialty of diseases of the chest. Dr Brock is serving as Secretary-Treasurer pro tem of the College and is the Chairman of the Council of Medical Directors and Superintendents of Tuberculosis Hospitals and Sanatoria

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Manuel Quisumbing, M.D, F C C P, City of San Pablo, Philippine Islands, recently made a trip to Europe. While in Spain he made the following addresses before the Academy of Medical Science: "The Campaign Against Tuberculosis in the Philippines," given in Bilbao, and "A Comparative Study of Clinical Forms of Tuberculosis in Children and Adults in Spain and its Types in the Philippines," given in Barcelona

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Herman E Hilleboe, M.D, F C C P, a Governor of the College, was appointed by Governor Thomas E Dewey as Commissioner of the New York State Department of Health. The appointment became effective July 1, 1947. Dr Hilleboe was formerly Assistant Surgeon General, associate chief of the Bureau of State Services of the United States Public Health Service

The film of Paul H Holinger, M.D, F C C P, and Ralph G Rigby, M.D, F C C P, "Kodachrome Cinematography of Bronchial Tumors," won the grand prize for the best scientific film at the World Film and Fine Arts Festival held in Brussels in June of this year

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The Peruvian Tuberculosis Society has elected the following new officers for the year 1947-1948

President Ramon Vargas Machuca, M.D, F C C P  
Vice-President Juan M Escudero Villar, M.D, F C C P  
Secretaries Alejandro Lengua Romero, M.D,  
R Celso Arellano Z, M.D  
Treasurer Segundo Hunco Vizcardo, M.D  
Librarian Carlos A Lopez Ore, M.D

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A paper entitled "Cancer of the Chest Cavity" was presented by Alton Ochsner, M.D, F C C P, New Orleans, Louisiana, at the Kentucky Division of the American Cancer Society which was held in St Joseph's Infirmary, Louisville, August 21, 22 and 23

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Karl Pfuetze, M.D, F C C P, Cannon Falls, William H Feldman, M.D, and H C Hinshaw, M.D, Rochester, Minnesota, were awarded a certificate of merit for their exhibit at the American Medical Association convention in Atlantic City in June Their exhibit was entitled "Streptomycin Experimental and Clinical Observations," and demonstrated the use of streptomycin in the treatment of tuberculosis

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T R Owens, M.D, F C C P, Muncie, Indiana, has been elected President of the Delaware-Blackford County Medical Society

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Leo Eloesser, M.D, F C C P, San Francisco, California, has returned to China on behalf of the World Health Organization Interim Commission Dr Eloesser was assigned as teaching specialist in surgery for the Chinese Medical Training Program of the UNRRA in 1945 He was formerly Professor of Clinical Surgery at Stanford University School of Medicine, San Francisco

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Paul H Holinger, M.D, F C C P, Chicago, Illinois, was elected Secretary of the American Broncho-Esophagological Association at their annual meeting in Atlantic City on June 9 The newly-elected President is Millard F Arbuckle, M.D, St Louis, Missouri, and Clyde A Heatly, M.D, Rochester, New York, was elected as Treasurer The Council members elected are as follows Drs Francis W Davison, Edward J Whalen, Robert M Lukens and Carlos E Pitkin

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John S Bouslog, M.D, F C C P, Denver, Colorado, has been elected President of the Colorado State Medical Society

The following officers were recently elected by the Colombian Tuberculosis Society

President Carlos Arboleda Diaz, M.D, F.C.C.P

Vice-President Jorge Llinas Olarte, M.D

Secretary Alfonso Vargas Rubiano, M.D

Treasurer Jesus M Barragan

Directors Alfonso Gutierrez P, M.D, Nazario Orozco R, M.D, and Zacarias Ayala, M.D

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Walter L Nalls, M.D, F.C.C.P, has been appointed clinical director of the Veterans Administration Hospital at Oteen, North Carolina Dr Nalls was formerly associated with Dean Cole, M.D, F.C.C.P, of Richmond, Va

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William S Conklin, M.D, F.C.C.P, and J K Poppe, M.D, F.C.C.P, of Portland, Orgeon, presented papers at the 73rd Annual Session of the Oregon State Medical Society, held in Portland, September 4-6 The title of Dr Conklin's paper was "Surgical Treatment of Cardiovascular Anomalies," and Dr Poppe spoke on "Bronchiectasis"

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Daniel W Wheeler, M.D, F.C.C.P, Duluth, Minnesota, President of the St Louis County Medical Society, presided at the Annual Banquet of the 94th Annual Session of the Minnesota State Medical Association held at the Hotel Duluth, on July 1st

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Myron D Miller, M.D, F.C.C.P, Washington, D C, Tuberculosis Control Division, U S Public Health Service, discussed "Recent Developments in Management and Control of Tuberculosis" at the meeting of the Peoria Medical Society on May 20th

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#### LIFE MEMBERSHIP

We are pleased to announce that the following physcians became Life Members of the American College of Chest Physicians, on the dates listed

Edward J Lynch, Shelton, Connecticut, Oct 8, 1946

Angela M Pliscitelli, San Francisco, California, Oct 28, 1946

Squire S Beverly, Rutland Heights, Massachusetts, Nov 20, 1946

Shelley U Marietta, Washington, D C, Dec 29, 1946

Chester G Crist, Gettysburg, Pennsylvania, March 13, 1947

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#### MANUAL ON RECORD SYSTEMS FOR TUBERCULOSIS CONTROL

The U S Public Health Service has prepared a manual to assist in the establishment of efficient record systems for tuberculosis control This manual presents a proved and tried method of keeping such records Copies may be obtained by writing to the Federal Security Agency, U S Public Health Service, Tuberculosis Control Division, Washington, D C

## MESSAGE FROM THE GOVERNOR OF THE COLLEGE FOR CHINA

To Colleagues of the  
American College of Chest Physicians

Gentlemen

First, may I convey my heartiest greetings from China?

Second, will you accept my sincere apology for being unable to attend this year's meeting of the College?

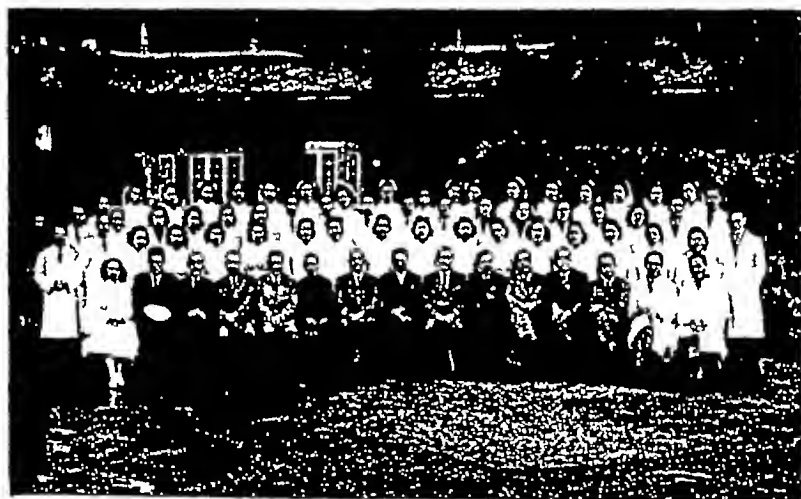
My impressions of the last few meetings of the College which I was privileged to attend, convince me how much I shall be missing spiritually and materially by this unavoidable absence. To me, the meetings were not only the sources of the greatest stimulation, but they were the means through which I had made so many staunch and esteemed friends.

On behalf of my Chinese fellow colleagues of the College, I wish the meeting unqualified success and the College continued progress in its service to humanity

Yours fraternally,

Dr Li Shu Fan, Governor,  
American College of Chest Physicians

*Staff, Hong Kong Hospital and Sanatorium, Hong Kong, China*



The above photograph was taken at the time of a visit of the Governor to the institution. Dr Li Shu Fan, Governor of the College for China, is Medical Director of the Hong Kong Hospital and Sanatorium

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### New Private Sanatorium Opened in Mexico City

The Sanatorio San Angel, Mexico City, was inaugurated on July 14 with suitable ceremonies for this auspicious event. Dignitaries representing important groups in Mexico City attended the inauguration.

The Sanatorio San Angel features the latest and most modern design in sanatorium construction. It is the first private tuberculosis sanatorium built in Mexico City and it will serve as a necessary armamen-

tarium in the control of tuberculosis not only in Mexico but in all of the nearby countries

Dr Donato G Alarcon, the Medical Director of the sanatorium, is well known to all of the members of the College The Board of Regents of the College, of which Dr Alarcon is a member, wishes him and his associates success in this new venture

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### TUBERCULOSIS SOCIETY OF ECUADOR

The Tuberculosis Society of Ecuador (Sociedad Ecuatoriana de Tislogia) met in Guayaquil on June 26 and elected the following officers for the year 1947-1948

President Jorge A Higgins, M.D, F C C P

Vice-President Jorge Fajardo C, M.D

Recording Secretary Jorge Perez A, M.D

Secretary of Scientific Sessions Ernesto Briones, M.D, F C C P

Treasurer Juan Villacis, M.D

Librarian Victor H Gavilanes, M.D

Directors Emilio Jaramillo L, M.D

Eduardo Rendon, M.D

Dr Jorge A Higgins was elected Governor of the College for Ecuador at the Annual Meeting held in Atlantic City, June 5-8, and Dr Juan Tanca Marengo was elected Regent of the College for Ecuador

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### ARMY MEDICAL LIBRARY MICROFILM SERVICE

During the war, the Army Medical Library, through its Photoduplication Services, supplied millions of pages of microfilmed medical articles to the armed services and other research agencies The principal of immediate aid direct to the user, wherever he might be, introduced a new technique to assist medical research

This service is now generally available for civilian physicians, institutions and research workers on a cost basis This means direct access to the library's enormous resources of medical literature

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For convenience and to keep bookkeeping costs down, a coupon system has been established Users may buy any quantity of photoduplication coupons at fifty cents each Order blanks are available upon request Checks should be made payable to the Treasurer of the United States, and sent to the Army Medical Library, 7th Street and Independence Avenue, S W, Washington 25, D C

# Medical Service Bureau

## POSITIONS WANTED

Physician soon to be released from service desires residency in chest diseases Experience includes an approved rotating internship one year in an approved tuberculosis sanatorium, and at present on large tuberculosis service in Navy Age 27, married, one child For additional information please address Box 234A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10 Illinois

Well trained chest surgeon, bronchoscopist, qualified for the American Board of Surgery interested in an association with established clinic, or a position in hospital or sanatorium with opportunity for private practice For additional information please address Box 235A, American College of Chest Physicians 500 North Dearborn Street, Chicago 10, Illinois

## POSITIONS AVAILABLE

Physician experienced in tuberculosis wanted for position of Assistant Director of Tuberculosis Control in city-county health department of midwest community Salary \$4 500 00 with full maintenance For additional information please address Box 168A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois

Staff physician wanted at tuberculosis hospital in midwest Starting salary \$275 00 plus maintenance for self and family For additional information please address Box 169A, American College of Chest Physicians 500 North Dearborn Street, Chicago 10, Illinois.



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Cabot Brown, M.D., San Francisco  
J. Lloyd Eaton, M.D., Oakland  
Glenroy N. Pierce, M.D., San Francisco  
Gerald L. Crenshaw, M.D., Oakland  
Ina Gourley, M.D., Oakland

### Medical Director

Buford H. Wardrip, M.D.

### Associate Medical Director

C. Gerald Scarborough, M.D.

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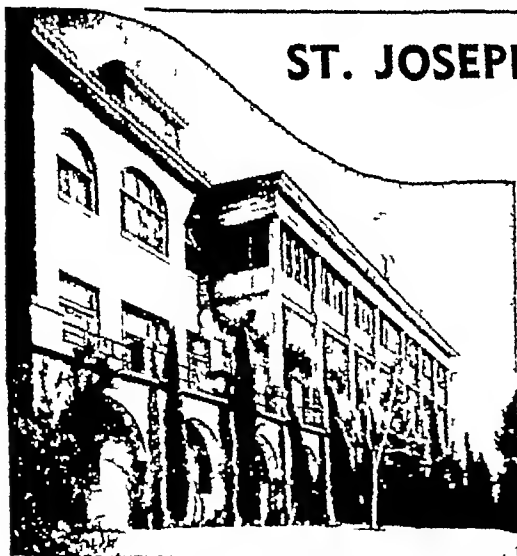
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<b>LAUREL BEACH SANATORIUM</b> Seattle, Washington	<b>SOUTHWESTERN PRESBYTERIAN SANATORIUM</b> Albuquerque, New Mexico
<b>MARYKNOLL SANATORIUM</b> Monrovia, California	<b>THE SAMUEL &amp; NETTIE BOWNE HOSPITAL</b> Poughkeepsie, New York
<b>PALMER SANATORIUM</b> Springfield, Illinois	<b>SANATORIUM SAN ANGEL</b> Mexico City, Mexico
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# DISEASES of the CHEST

OFFICIAL JOURNAL OF THE  
AMERICAN COLLEGE OF CHEST PHYSICIANS

## EDITORIAL OFFICE

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Minneapolis 14 Minnesota

## EXECUTIVE OFFICE

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Chicago 10 Illinois

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